

Coal Age



MOVING COAL TO MARKET . . . p 70

**King Mine • Moving Big Shovel • Low-Cost Haulage
Sludge-Pond Recovery • Streamlining Mine Paperwork
Non-Stop Face Haulage • Matching Mine and Market**

NO HAULAGE SHUTDOWNS

with **MINE CARS**



WHY be satisfied with a haulage system that may send your tonnage up one day...down the next?

- Only with 'constant haulage' mine cars can you be sure of getting out a *constant high tonnage* of coal!
- Only with 'constant haulage' mine cars can you be sure your coal hauling system will never break down 'all at once'.
- Only with 'constant haulage' mine cars can you

be sure that you can keep right on producing coal while repairs are going on!

Whether you're opening a new mine, or remodeling an established one, you should know the advantages an Q.C.f. Mine Car system holds for *your* mine. Your nearby Q.C.f. Representative has the facts at his fingertips. American Car and Foundry Company, New York • Chicago • St. Louis • Cleveland • Philadelphia • Huntington, W. Va. San Francisco • Washington • Berwick, Pa.

Q.C.f. MINE CARS
for Constant Haulage

B.F. Goodrich



Better protection—lower costs with Koroseal trolley guard

Won't rip, rot or burn, has high dielectric strength

YOU can get extra protection without extra cost, by specifying B. F. Goodrich Koroseal trolley guard. It is easier to install than wooden shields, lasts longer and needs no maintenance.

Hazard of electric shock eliminated
—Koroseal guard has an insulation factor many times as great as that required for average line voltage. Dampness does not affect the insulating qualities of Koroseal, as it does wood. Danger of electric shock is reduced with Koroseal.

One-piece, reinforced construction
—Reinforced edges and center make

Koroseal guard hang properly in "U" shape. Does not hinder trolley operations. Not harmed by acid mine water, mine damp nor the gases that rot other type guards.

Tear-resistant, even after exposure to hot arcs from locomotive trolley poles. Will not burn unless flame is applied directly. Burning stops when flame is removed. Resists spread of flash fires caused by arcing trolleys.

Koroseal trolley guard comes in two sizes: 12" edge to edge for single wire trolleys and 18" for double. It is packaged in 100 foot rolls. Koroseal trolley

guard is easy to cut, easy to hang—no grooving is necessary. The next time you install or replace trolley guard, it will pay you to get in touch with your B. F. Goodrich distributor. He will show you how to get more protection for your money. *The B. F. Goodrich Company, Koroseal Division, Marietta, O.*

Trade Mark—Reg. U. S. Pat. Off.

Koroseal
TROLLEY GUARD
BY
B.F. Goodrich

The Champion

"JOHNNY
APPLESEED"

*The tree planter
who became a hero
of American folklore*

Just 150 years ago this year, a tall, thin, dark eyed stranger named Jonathan Chapman appeared in Licking Spring, Ohio. He took some apple seeds from a burlap bag, planted them, put a fence around the plot... then vanished. That was the first appearance of "Johnny Appleseed." Getting his seeds from the cider presses in Pittsburgh, the beloved Johnny planted his orchards the length and breadth of the land. Wherever apples bloomed fresh in the wilderness men knew that Johnny Appleseed had passed by. His simple way of life and his work made him a legend long before he died in 1845. Men of his day who gained riches and renown are long forgotten; but still tenderly remembered is this simple man who scorned wealth and power and prestige to care for the things of tomorrow as he walked through early American history.



HULBURT OIL & GREASE COMPANY, PHILADELPHIA, PA.

Specialists in Coal Mine Lubrication

The Champion

...IN COAL MINE LUBRICATION



Hulburt *Quality* *"The Champion"* **GREASE**

There's just one seed we want to plant in your mind today and that is — HULBURT QUALITY GREASE is made to do supremely well the one job of lubricating coal mining machinery. The length and breadth of the coal mining industry, you find the smoothest running and longest running machines lubricated by HULBURT. Hulburt Grease is beloved by experienced mine operators because of this simple fact of QUALITY through specialization. Yes, your coal mining machinery will run longer and better, lubricated by Hulburt Grease — and that's no applesauce.

WHAT GOOD IS A NICKEL OR A PENNY THESE DAYS?

Here's how good they are when you're
equipped with
BIRD COAL FILTERS

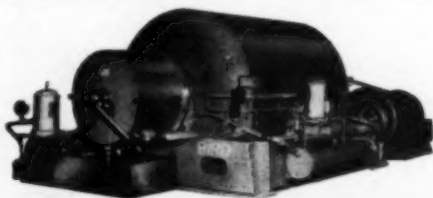
FIVE CENTS

is all it costs you to take the water out of *one ton* of fine coal — and the Bird Coal Filter gets the coal as dry as mechanically possible.

ONE CENT

or at most two cents *per ton* is all it costs you to maintain the Bird Coal Filter. More than twenty million tons put through Bird Filters are the basis for these figures.

Why not get the whole story on fine coal drying and clean, closed circuit water (no disposal problem) via the Bird Coal Filter and Bird Polisher.



BIRD MACHINE COMPANY
SOUTH WALPOLE • MASSACHUSETTS

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THIS MONTH'S COVER

THIS NEW TANDEM LOCOMOTIVE operating on a new main haulageway is but one of the several interesting features of the modernization program at the King mine of the U. S. Fuel Co. described on pp 76-81. Substantial savings, in addition to an increase of 90 tons per shift per trackless-mining unit in the first month after completion of improvements, resulted from the program. You'll want to take a look, too, at the twin reels on its shuttle cars, which King mine is now testing to reduce cable failures and simplify splicing.

COMING IN DECEMBER

How Many Men Can You Boss?
 —What's the best staff size and organization for maximum results
 —What's the practice in coal mining?

The Blue Diamond Story—A comprehensive operating description of the Leatherwood mine of the Blue Diamond Coal Co. and the recently completed 700-tph modern preparation plant.

Aluminum Cars and Diesels—How Dominion Coal has proved the economy and performance of aluminum mine cars after 4 yr of testing, together with details of its successful experience with diesel locomotives underground.

The Index of 1951 Coal Age—As a reader service, *Coal Age* will incorporate in the December issue a detailed index of the articles published during 1951. You'll find articles classified by subject, company and mine, and author.

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ASSURE STARTS.

... for every type of mine car, with **TEXACO OLYMPIAN GREASE**

LUBRICATE your mine cars with *Texaco Olympian Grease*, and they will start easier, roll smoother—all winter long! You'll haul more tonnage . . . be better able to keep abreast of rising military and civilian demands. At the same time, you'll be making a saving because *Texaco Olympian Grease* assures longer bearing life . . . lower maintenance costs.

Texaco Olympian Grease stays in the bearings (plain, cavity hub or anti-friction), seals out dirt and moisture. *Texaco Olympian Grease* resists oxidation . . . will not separate in service or in storage. Cost-saving *Texaco Olympian Grease* is available in three consistencies to meet all requirements.

For economies in hydraulic mechanisms—above or below ground, at all temperatures—use *Texaco Regal Oil (R&O)*. This turbine-quality oil keeps systems clean—free from rust, sludge and foam. It's your best bet for continuous operation, longer pump life and lower maintenance costs.

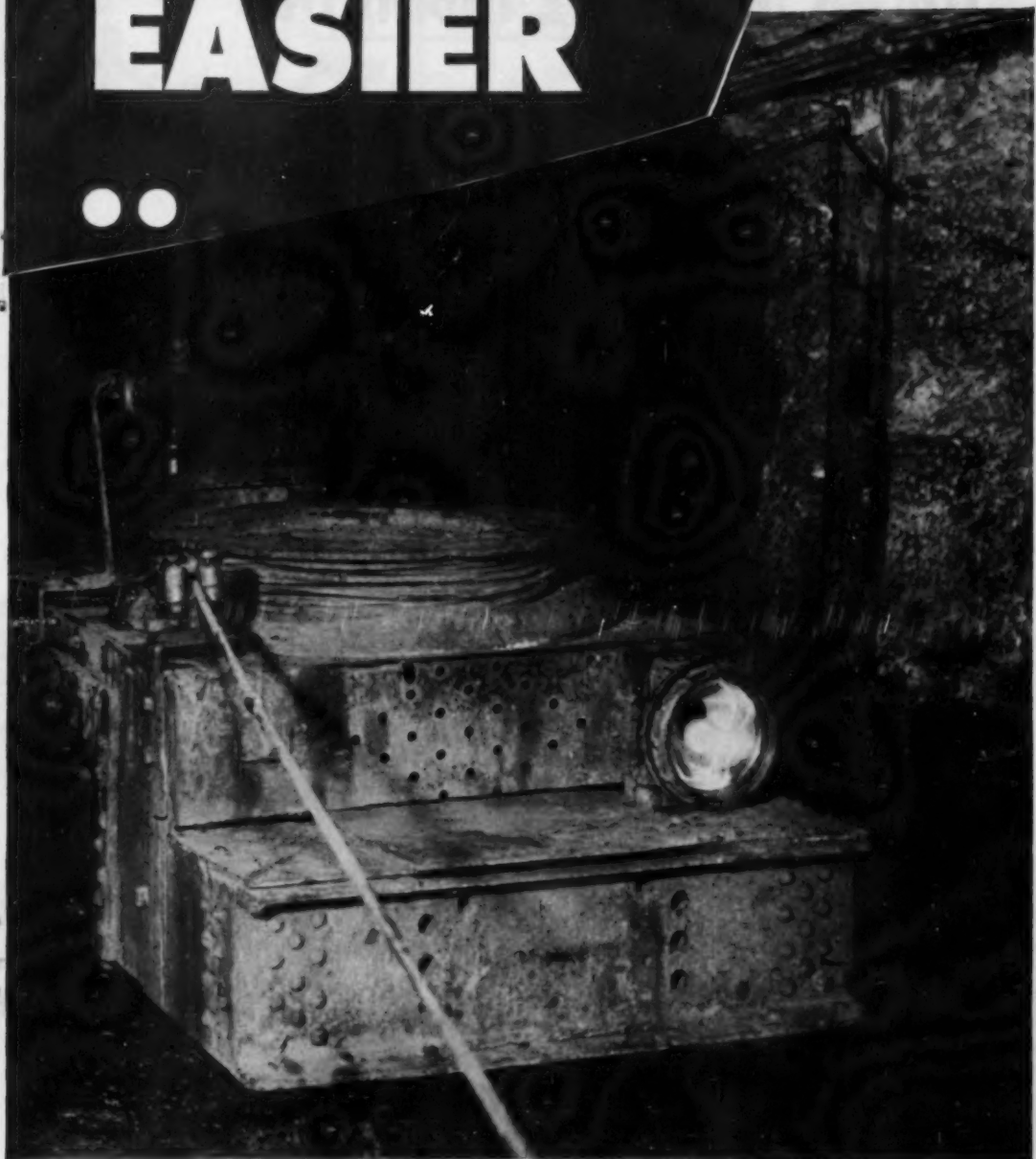
Let a Texaco Lubrication Engineer help you boost production and cut costs throughout your mine. Just call the nearest of the more than 2,000 Texaco Distributing Plants in the 48 States, or write The Texas Company, 135 East 42nd Street, New York 17, N. Y.

TUNE IN . . .
TEXACO STAR THEATER
starring
MILTON BERLE
on television
every Tuesday night.
See newspaper for
time and station.



TEXACO

EASIER



For the Coal Mining Industry

Here's what WE mean by The Newest, Finest

DESIGNED FOR YOUR JOB

These Allis-Chalmers tractors are new models, not merely refinements of existing ideas . . . they are new from the ground up . . . without compromise anywhere in design or material.

They are the answer to your demands for tractors that will give you outstanding performance with any equipment — mounted or drawn. New POWER, WEIGHT and BALANCE put each model in a class by itself! And there's a complete new line of Allied equipment to match these tractors for your job.

BUILT TO "TAKE IT" . . .

These are the finest tractors ever built . . . with ample capacity and strength in every part! And that's no accident! To bring you tractors like these . . . with the qualities you want . . . Allis-Chalmers built them completely new.

You can depend on them to take the loads and jolts of today's jobs . . . because they are modern tractors built for the most grueling operating conditions. They will more than measure up to your expectations!



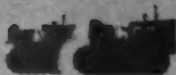
HD-5

40.26 drawbar hp., 11,250 lb.

HD-9

72 drawbar hp., 18,800 lb.

YEARS AHEAD



Each of these new Allis-Chalmers crawlers gives you a new yardstick for rating tractors. Each sets new standards in its class for performance, strength, servicing, operation. Get the full story from your Allis-Chalmers dealer NOW on this — The Newest, Finest Tractor Line on Earth.

ALLIS

TRACTOR

Tractor Line on Earth!

EASY TO OPERATE . . .

Operators have long awaited the greater handling ease and comfort now brought to them by this new line of Allis-Chalmers tractors.

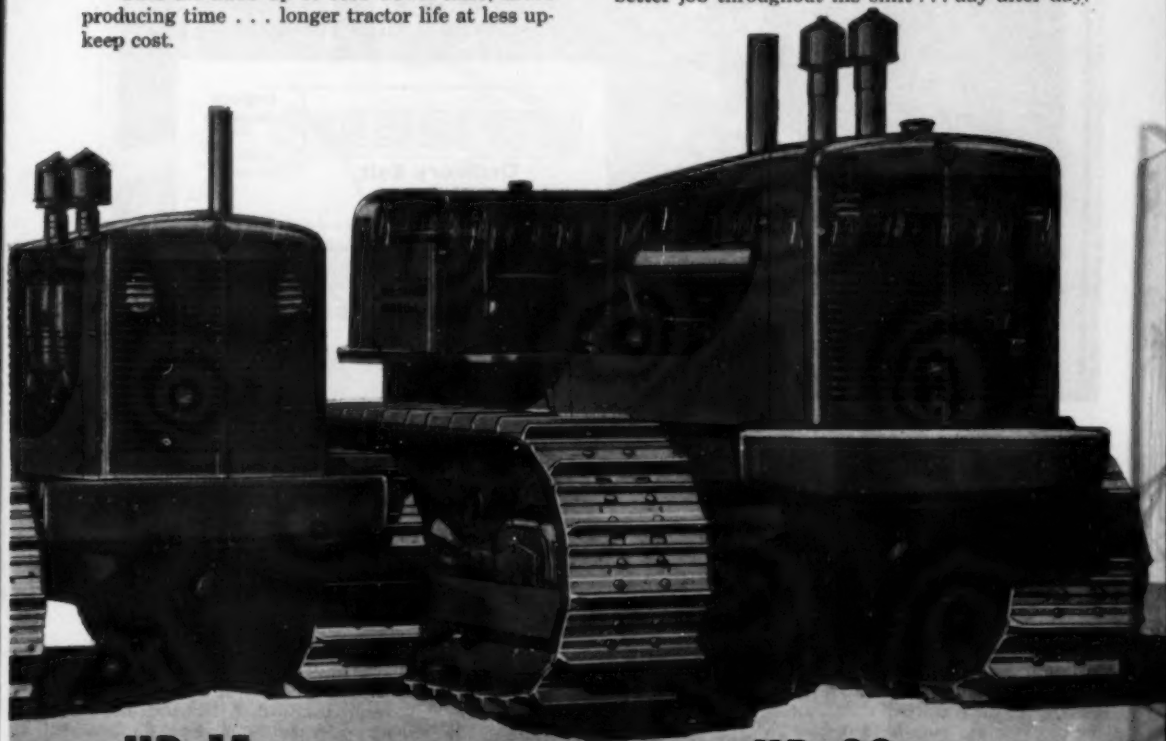
Conveniently located controls respond to the slightest effort . . . and are operated in the same familiar way—nothing tricky to "catch on to." There is new shifting ease, new seat and platform comfort, full visibility.

Because the operator's job is easier—takes less effort—he can maintain a steady pace, do a better job throughout his shift . . . day after day.

EASY TO SERVICE . . .

Adjustments are easier . . . lubrication simplified and lube periods greatly extended. Mechanics say these tractors are the easiest to service and repair.

This all adds up to less down time, more producing time . . . longer tractor life at less upkeep cost.



HD-15

109 drawbar hp., 27,850 lb.

HD-20

Hydraulic Torque Converter Drive, 175 net engine hp., 41,000 lb.

CHALMERS

DIVISION • MILWAUKEE 1, U.S.A.

RESEARCH KEEPS

B.F. Goodrich

FIRST IN RUBBER

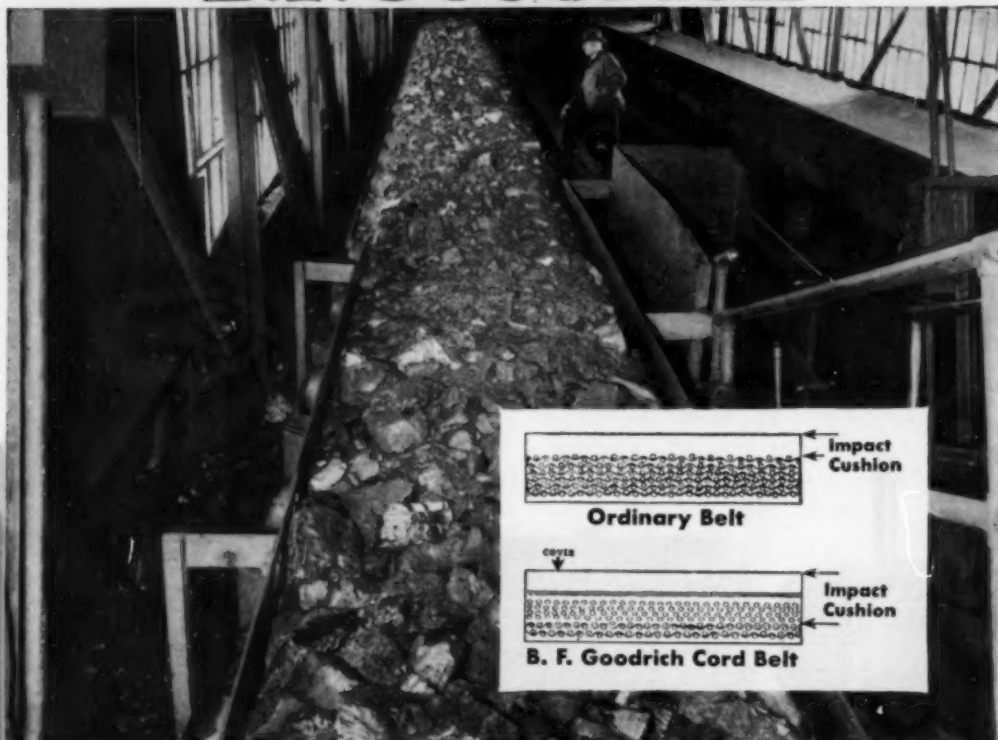


Photo courtesy The Philadelphia and Reading Coal and Iron Co.

Cord belt unharmed by acid water doubles record of previous belts

B. F. Goodrich Beltroad solves a coal-handling problem

THIS conveyor belt carries run-of-mine anthracite coal from a car dump up an incline to the top of the breaker. It's the fourth belt used since the conveyor was built in 1930. Each of the three previous belts lasted only four years. Acid mine water seeped into the carcass, weakening the fabric. The B. F. Goodrich man recommended the B. F. Goodrich cord conveyor belt. It's the belt shown here, in its 9th year of service, looks good for many more. Here's why:

Resists moisture, acid—Each lengthwise cord in a B. F. Goodrich cord belt is completely surrounded by rubber. A cut in belt cover admits acid to only those cords exposed; there are no

cross cords through which acid could spread from cord to cord or ply to ply, as in fabric belts.

Resists impacts—With parallel cords in live rubber, under impact the rubber distorts temporarily; distributes and absorbs shocks that would damage stiff, unyielding plies. This impact cushion resists cuts, gouges. A *Transcord Breaker* floated above and across the cord section helps cushion impact, keeps cover from stretching beyond elastic limits. Provides better adhesion (at least 50% better) between cover and carcass.

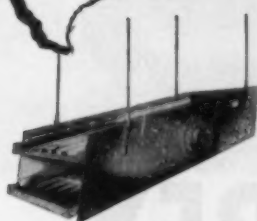
Troughs better—Belt is more flexible lengthwise and crosswise; makes

better contact with pulleys. Nine-ply or ten-ply belts in narrow widths trough perfectly; permit longer centers, higher lifts.

Whatever the size of the coal you move by belt, a B. F. Goodrich belt designed for coal-handling can do the job better, for less. Call in your local BFG distributor, or write us direct: *The B. F. Goodrich Company, Industrial and General Products Division, Akron, O.*

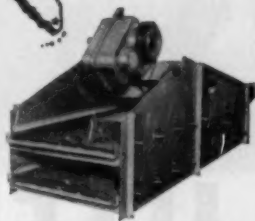
Beltroads **BY**
B.F. Goodrich
 RUBBER FOR INDUSTRY

Want Help **WITH SCREENING?**



RIPL-FLO SCREEN

A high capacity inclined vibrating screen with two-bearing mechanism. Low weight, maintenance, power requirement.



LOW-HEAD SCREEN

A horizontal screen for wet or dry screening, rinsing or dewatering. Straightline motion. Saves headroom, space.

AERO-VIBE SCREEN

A sturdy, low cost vibrating screen for sizing, sludge dewatering, draining. Makes separations 1½ in. square to 28 mesh.

ALLIS-CHALMERS district offices offer you the services of experienced vibrating screen engineers. In all mining areas are specialists who have the training and experience to help you get top screening performance and lowest screening costs for your job.

These experts will come into your plant, look over your present equipment, and suggest how your screening can be made a more profitable operation. Their

recommendations are unbiased because Allis-Chalmers builds *all* types of vibrating screens . . . for *any* screening application. All Allis-Chalmers screens can be obtained complete with motor, drive and control.

Feel free to call on Allis-Chalmers for real help in solving screening problems. You'll be getting the finest engineering and experience available anywhere. Allis-Chalmers, Milwaukee 1, Wisconsin.

3512

Pulverator, Low-Head, Rip-Flo and Aero-Vibe are Allis-Chalmers trademarks.

ALLIS-CHALMERS



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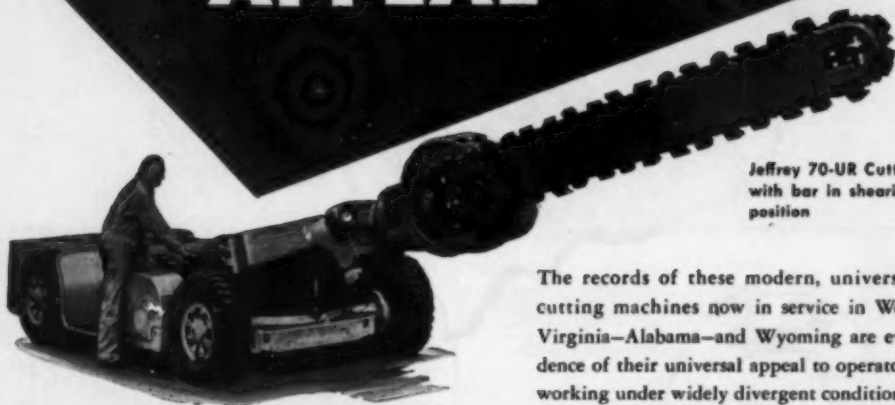


Kilns, Coolers, Dryers

A UNIVERSAL CUTTER

with

UNIVERSAL APPEAL



Jeffrey 70-UR Cutter
with bar in shearing
position

The records of these modern, universal cutting machines now in service in West Virginia—Alabama—and Wyoming are evidence of their universal appeal to operators working under widely divergent conditions. Again, Jeffrey is living up to its reputation for building dependable, cost-saving equipment . . . this time in the field of trackless mining.

JEFFREY



Jeffrey 70-UR Cutter with
bar in top cutting position

Call in a Jeffrey Mining Engineer for help on your cutting and other mining problems . . . take advantage of Jeffrey experience, engineering "know-how" and complete manufacturing facilities.

70-UR



Jeffrey 70-UR Cutter with bar
in bottom cutting position



This picture really brings out the sturdy construction and massiveness of the Jeffrey 70-UR Universal Coal Cutter. It is shown making a shearing cut in the mine. Full hydraulic controls provide ease of operation for all adjustments and feeds. Trimming and cable reel operation are also hydraulic.

We will be glad to tell you more about this 70-UR machine, mounted on rubber tires, and what it can do for you.

The Jeffrey Manufacturing Company

(Founded in 1877)

912 North Fourth Street, Columbus 16, Ohio

District Offices

Baltimore 2	Buffalo 2	Denver 2	Houston 2	Philadelphia 3
Beckley, W. Va.	Chicago 1	Detroit 13	Jacksonville 2	Pittsburgh 22
Birmingham 3	Cincinnati 2	Forty Fort, Pa.	Milwaukee 2	Salt Lake City 1
Boston 16	Cleveland 15	Harlan, Ky.	New York 7	St. Louis 1

Service Stations

Birmingham — Pittsburgh — Johnstown — Forty Fort, Pa. — Mt. Vernon, Ill. — Harlan, Ky.
In West Virginia: Beckley — Cabin Creek — Logan — Morgantown — Welch

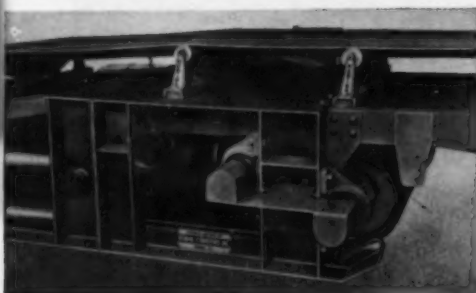
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Jeffrey Mfg. Co., Ltd., Montreal, Canada
British Jeffrey-Diamond Ltd., Wakefield, England
Jeffrey-Gallion (Pty.) Ltd., Johannesburg, S. A.

The Gallion Iron Works & Mfg. Co., Gallion and Bucyrus, Ohio
Gallion (Great Britain) Ltd., Wakefield, England
The Ohio Malleable Iron Co., Columbus, Ohio
The Kilbourne & Jacobs Mfg. Co., Columbus, Ohio

Bin Valves
Bucket Elevators
Car Pullers
Chains
Conveyors (Chain or Belt)
Cool Cutters
Continuous Mining Machines
Crushers
Drills
Feeders
Fans & Blowers
Idlers (Belt)
Jigs and Washers
Loaders
Loading Booms
Locomotives
Magnetic Separators
Screens
Shuttle Cars
Transmission Machinery

ROOM...MOTHER...OR SLOPE

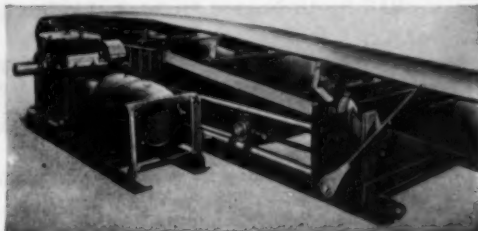


SINGLE OR TANDEM DRIVE

Hewitt-Robins Mine Conveyors come equipped with both single and tandem pulley drive elements. Provide ample horsepower for lift and length up to the very limits of belt capacity. Reeving of belt handles level, uphill or downhill service requirements.

UNIFIED DRIVE SECTION

Motor, reducer and controls mounted on a single base—skid-designed for easy moving about. Can be located on either side of the conveyor. Drive reversible—incoming for men and material, outgoing for high output of product.



there's a Hewitt-Robins Mine Conveyor to meet your specific requirements

Solve your underground conveying problems the easy, economical way. With a choice of **THREE** types of Hewitt-Robins Mine Conveyors, you are sure to get exactly the equipment you want.

TYPE I has *internal* drive for level or *uphill* operation; in 26", 30", 36" and 42" widths—lengths to 3000 feet or more.

TYPE IS has *internal* drive for level or *downhill* operation; in 26" and 30" widths—lengths to 3000 feet or more.

TYPE H has *head* drive for level or *uphill* operation; in 26" and 30" widths—lengths to 2000 feet.

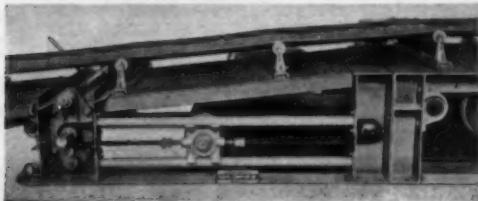
Intermediate Sections are standard, fit all three types. Assembly is easy—both ends are identical, need no "matching up." Made in 8' and 10' rigid and demountable sections. Also available are *Intermediate Channel Sections* in 12' lengths—30", 36" and 42" widths.

Only Hewitt-Robins can offer you a complete

mine conveyor "package"—machinery *plus* belt, motor, reducer and drive! You can order equipment to fit your needs to a "T"—single or tandem pulley drive . . . internal or tail takeup . . . the famous Ajax® heavy-duty belt, in the required length and width.

The sturdy machinery is built for the toughest kind of service. You get ball or roller bearing, one-shot lubrication idlers . . . lagged pulleys for maximum power transmission . . . a conveyor backed by over half a century of engineering and manufacturing experience. And, only Hewitt-Robins leaves you worry-free—takes complete *unified* responsibility for successful performance of machinery *and* belt!

Make sure you get the best for your money. Write for detailed specifications. Address: Hewitt-Robins Incorporated, 1010 Pennsylvania Ave., Charles*on, W. Va., or 270 Passaic Ave., Passaic, N. J.



INTERNAL TAKEUP

Located directly back of the drive. Handles 10' of belt slack. Operated by reversible ratchet-wrench working on gear reduction to minimize manual effort. Arranged so an automatic counterweighted gravity take-up can be added if desired—eliminating manual adjustment. Double-acting pawl prevents back up.

NEW 2¼" TROUGHING IDLER has roller bearings. Demountable, easy to assemble under the belt. Triple grease seal locks grease in, keeps dirt and moisture out.

Hewitt-Robins is participating in the management and financing of Kentucky Synthetic Rubber Corporation.



TAIL SECTION

Telescopic type to provide tail takeup action. Easy to clean out—no steel work under tail pulley. Has transverse cover to protect pulley, bearings and belt. Strong enough so that you can rest a feeder on it.

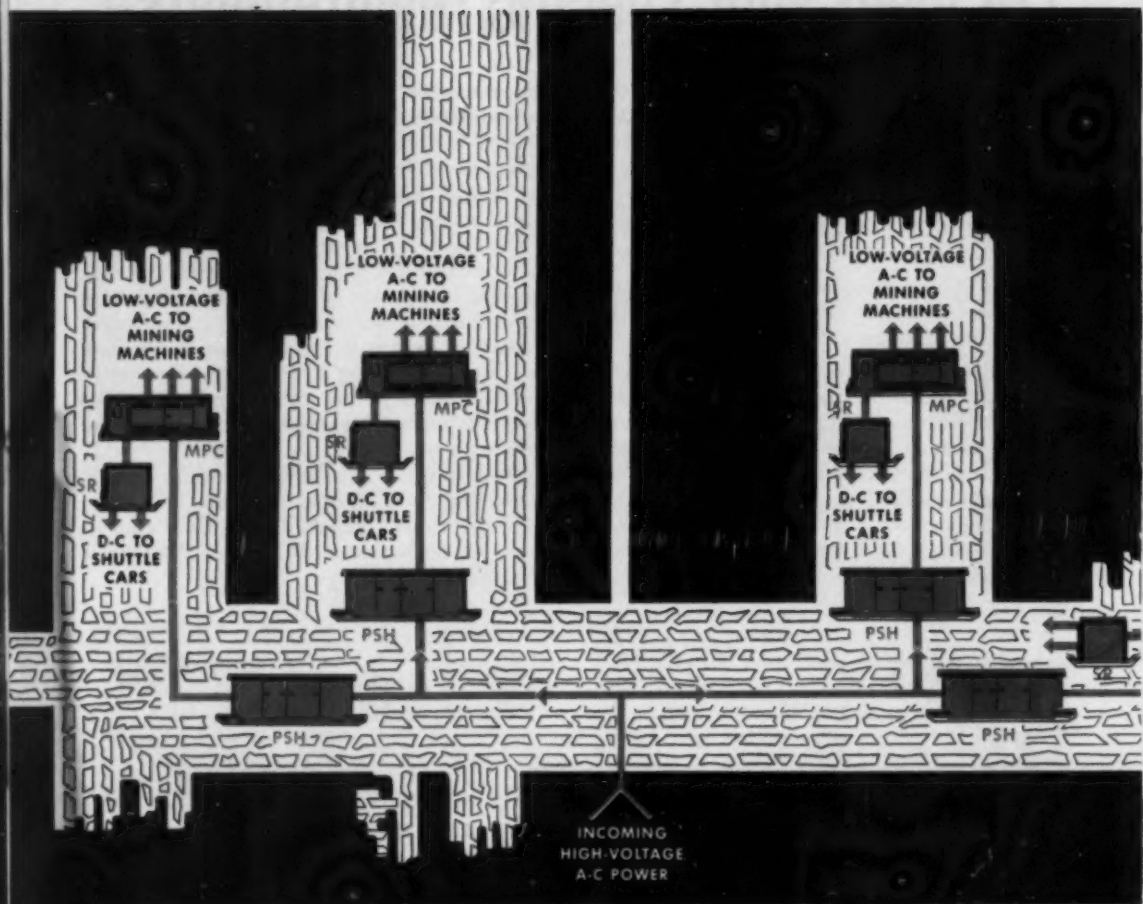
HEWITT-ROBINS
MINE CONVEYORS

HEWITT-ROBINS



INCORPORATED

BELT CONVEYORS (belting and machinery) • BELT AND BUCKET ELEVATORS • CAR SHAKEOUTS • DEWATERIZERS • FEEDERS • FOAM RUBBER PRODUCTS • FOUNDRY SHAKEOUTS • INDUSTRIAL HOSE • MINE CONVEYORS • MOLDED RUBBER GOODS • RUBBERLOK® ROTARY WIRE BRUSHES • SCREEN CLOTH • SKIP HOISTS • STACKERS • TRANSMISSION BELTING • VIBRATING CONVEYORS, FEEDERS AND SCREENS



PSH—Portable Switch-house



MPC—Mine Power Center



SR—Silicon Rectifier

Three new developments for A-C power systems

Here's the latest and best in power supply for a-c mining—three brand-new Westinghouse developments for use underground. Chart at left shows how they're applied.

1. New switch-house controls high-voltage power

High-voltage power comes down a shaft or borehole, then is sent out through individual feeders to the various working areas. Each feeder should be protected. Best way: the new Westinghouse underground switch-house. It immediately isolates the feeder in event of ground-fault, overcurrent or short circuit so that the rest of the system isn't affected.

2. Mine Power Center transforms it down

This new Mine Power Center keeps power supply where it's needed—close to the working face. Four working areas and four Power Centers are shown at left. This new unit is basically an air-cooled transformer with outgoing low-voltage feeders. A circuit breaker protects each feeder against overcurrent and ground-faults.

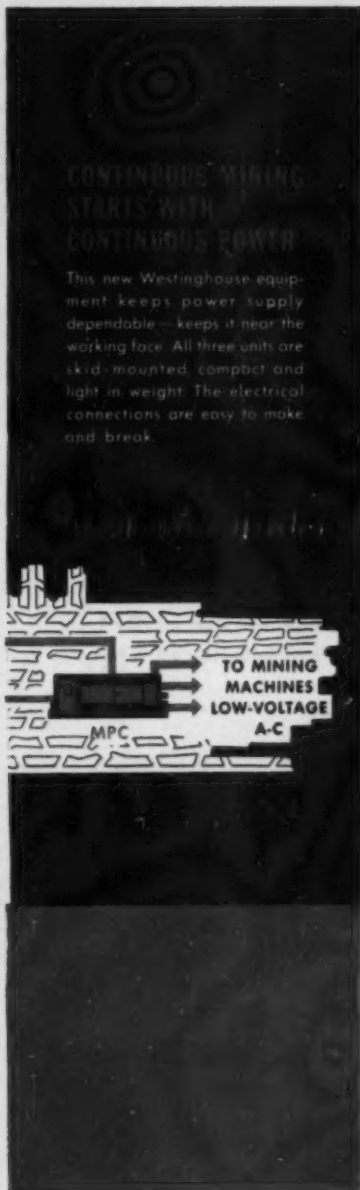
3. New rectifier supplies small blocks of d-c

Here's the ideal way to supply the small amounts of d-c needed in a-c mines. The new Westinghouse selenium rectifier takes a-c from the Power Center and supplies d-c through circuit breaker protected outlets. There are no major moving parts in this unit—the rectifier itself is a simple, static, plate-type device.

Call Westinghouse early on EVERY job

Westinghouse has a great deal of experience in all types of electrical equipment for mining. We can help you cut costs and improve your operations. When your next project comes up, call your Westinghouse office early in the planning stage. And for more information on these three new developments, write for B-5423. Westinghouse Electric Corporation, Box 868, Pittsburgh 30, Pa.

J-94901



YOU CAN BE SURE... if it's
Westinghouse

**EQUIPMENT FOR
THE MINING INDUSTRY**



Before you decide on any... see

Mine performance is the most convincing proof that we can offer of Goodman loading machine efficiency. Let us arrange a mine visit so that you can see for yourself these advantages that you can get only with Goodman tractor tread loaders—advantages that will save you time and money, and promote safety:

Swinging loading head — 40° swing to either side of center line permits wide clean-up with only forward and backward movement of the machine—shuttle car stays under discharge boom; pillars can be extracted with little loss in loading capacity; break-throughs can be driven at right angles in narrow places.

Swinging discharge end — provides for quick alignment with shuttle car. There is also a vertical range for adjustment to shuttle car height.

Powerful digging action in tight coal — a wide range of vertical movement of the loading head permits tight coal to be attacked at most effective height (see sketch).

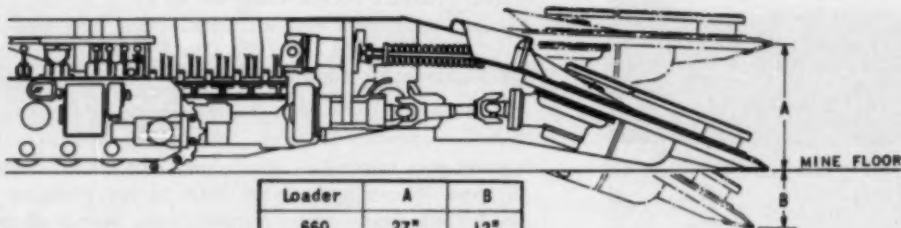
Floating loading head — loose coal is loaded out on irregular bottom without digging in and without need of constant attention on part of the operator.

Continuous loading action — gathering arms and chains move fast and continuously, flow of coal to discharge end is constant.

Safety for operator — operator is in safe position well back from loading head at conveniently grouped hydraulic controls; all machine movements within range of vision, all are smooth and positive.

Sound design — rugged construction throughout with convenient accessibility to all working parts. Maintenance cost is low.

VERTICAL LOADING RANGE
of Goodman Tractor Tread Loaders

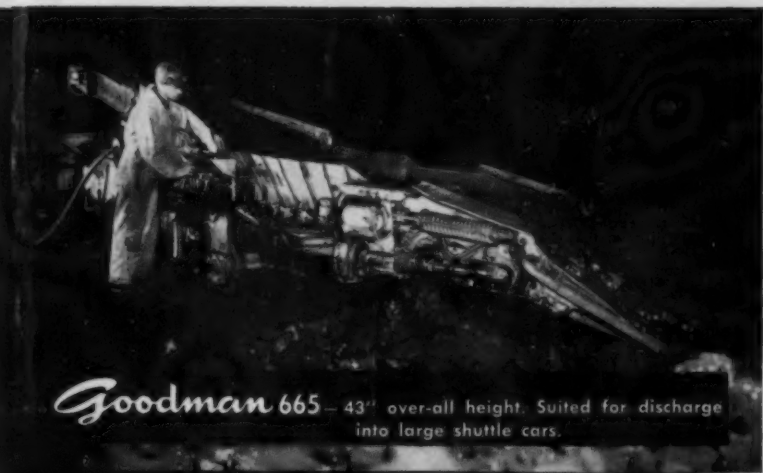


Loader	A	B
660	27"	12"
665	30½"	11"
860	19"	12"

Goodman
4834 S. Halsted St.

MANUFACTURING COMPANY
Chicago 9, Illinois

GOODMAN
TRACTOR
TREAD
LOADERS
IN
Action



Goodman 665—43" over-all height. Suited for discharge into large shuttle cars.



Goodman 660—31½" over-all height, 22" coal line height.



Goodman 860—26½" over-all height, 17" coal line height.

you can't beat progress...

ELECTRIC **P&H** SHOVELS

All the advancements in electrical digging made by P&H have one common purpose — *lower tonnage costs.*

Here's *faster operation* with such P&H improvements as Magnetorque® Hoist Drive, stepless power regulation . . . independent propel for faster move-ups.

Here's *steadier digging* — many of the old mechanical devices which caused trouble and delay are eliminated — no slip friction clutches; no sliding gears to shift, no electrical contactors in main control system.

Here's *lower maintenance cost* — all-welded construction originated by P&H — induction-hardened gearing — filtered air cab.

When you put these, and other progressive P&H ideas to work, you're sure of lower tonnage costs in all kinds of open-pit operations.

P&H leads the field in electric shovel developments.

*T. M. of Harnischfeger Corporation for electro-magnetic type clutch.

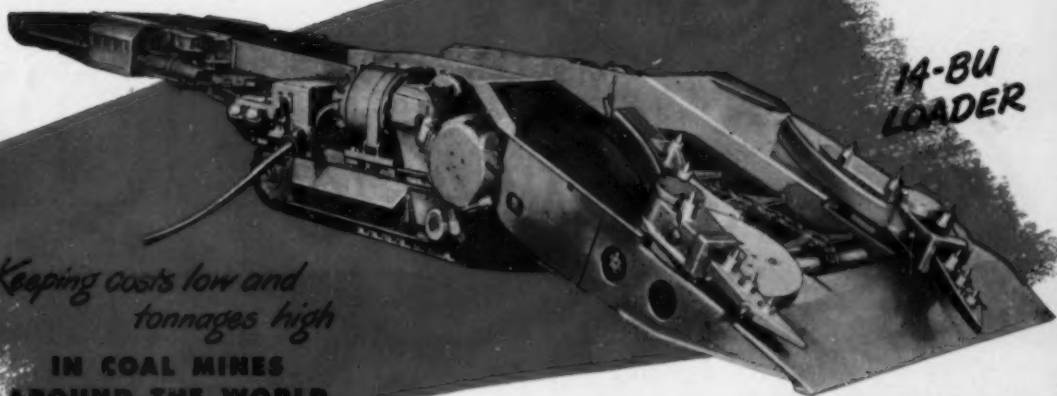


These two 4-yd. electric shovels have played a big part in the successful change to open pit mining at Inspiration Consolidated Copper Mines at Inspiration, Arizona. A third P&H will provide increased production to meet the growing need for copper.



Every third P&H Electric Shovel sold is a repeat order

EXCAVATORS • OVERHEAD CRANES • HOISTS • ARC WELDERS AND ELECTRODES • SOIL STABILIZERS • CRAWLER AND TRUCK CRANES • DIESEL ENGINES • CAME LOADERS • PRE-ASSEMBLED HOMES



**14-BU
LOADER**

*Keeping costs low and
tonnages high*

**IN COAL MINES
AROUND THE WORLD**

The JOY 14-BU Loader is a high production, low-vein machine with a capacity up to 8 tons a minute. Produced in heights of 30 $\frac{1}{2}$ ", 33" or 36", economical in operation and rugged. Like all JOY Loaders, it is highly flexible, with a chain conveyor that swings 45° to either side.

JOY

LOADERS, CUTTERS, SHUTTLE CARS and MOBILE COAL DRILLS

Illustrated on this page is a typical JOY "team" of high-production mining machines for thin-seam trackless operation. In soft or hard coal—no matter what your mining conditions are—you'll realize greater efficiency and economy with *field-proved* JOY Equipment . . . built by the world's largest producer of underground mining machinery.

**11-RU
CUTTER**



JOY Trackless Universal Cutters—the 11-RU for low coal and the 10-RU for thick seams—are highly maneuverable, fast, hydraulically controlled machines that can make horizontal or shear cuts anywhere in the face.

**6-SC
SHUTTLE
CAR**



The JOY 6-SC Shuttle Car is ahead of anything in its class in safety features and operating advantages. Only 29" high for thin seams—has four wheel drive, four wheel steering, hydraulically adjustable elevating discharge.

JOY Mobile Coal Drills are highly maneuverable, fast-tramming units that feature an exclusive, automatic, infinitely variable control of both rotation and feed in drilling. The CD-25 is a single-boom, hydraulically controlled, 36" drill for average conditions. The CD-26 is a twin-boom model.

**CD-25
COAL
DRILL**



Write for Bulletins, or

Consult a Joy Engineer

JOY MANUFACTURING COMPANY

GENERAL OFFICES: HENRY W. OLIVER BUILDING • PITTSBURGH 22, PA.

IN CANADA: JOY MANUFACTURING COMPANY (CANADA) LIMITED, GALT, ONTARIO

W&D CL 2048

Progress Report on the **JOY**

SIZE	SIX CUTTER CHAINS CHANNEL LACING	ROTARY DRUM HEAD	REMARKS
	PER CENT	PER CENT	
+ 6" sq.	3.14	4.73	Sizes above 1 inch increased 55%
6" x 2" sq.	11.49	16.52	
2" sq. x 1" rd.	12.33	19.80	
1" rd. x ½" rd.	19.04	17.28	
½" x 5/16 sq.	8.28	6.19	Sizes below ½ inch reduced 22.5%
5/16 sq. x 8 M.	21.64	17.05	
8 M. x 10 M.	4.28	3.37	
10 M. x 48 M.	12.65	9.82	
48 M. x 200 M.	4.32	3.24	
—200 M.	2.83	2.00	
TOTAL	100.00 NOVEMBER 28, 1950	100.00 DECEMBER 12, 1950	

Tests of New Ripping Development Show *22% less fines* in Average Production

There is not a single machine of Joy manufacture which is not subject to constant research study, engineering development and change. We consider that endless search for improvement is our primary obligation to the mining industry.

An important forward step of this nature has now taken place in the Joy Continuous Miner, with the development of a new rotary drum type of ripping head. This rotary head has been in operation underground in the Illinois No. 6 seam, and in the Pittsburgh seam in West Virginia. One of the earlier size consist

studies is shown above, comparing the rotary drum head with the original 6-chain head. These favorable results have been fully confirmed by all later tests.

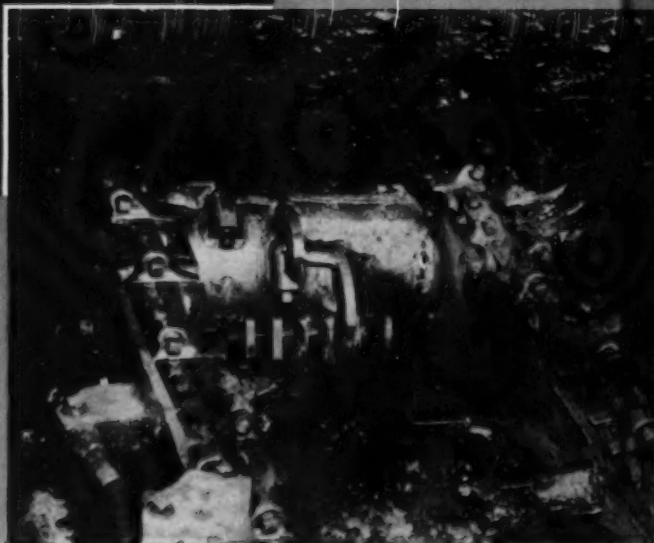
The reduction of more than one-fifth in the coal produced in sizes below ½ inch, with the accompanying large increase in sizes above 1 inch, is a major point, of course. But several other marked advantages have been secured as well, such as: greatly reduced overall maintenance, approximately one-quarter less power consumption, vastly increased bit life and reduced bit cost—all without any sacrifice of tonnage.

CONTINUOUS MINER



A Joy Continuous Miner with the new rotary drum head is shown here in operation in the Pittsburgh seam. Power requirements for the machine are reduced 20 to 30% with the rotary head, providing less load throughout the drive, transmission and control units, and—combined with other improvements in design and materials—assuring a major improvement in overall machine performance.

View of the same machine, looking toward the face from approximately the operator's position, and showing considerable large lump production. The new rotary head contains only about half the number of bits used in the 6-chain head, and in addition, bit life has actually been increased 4 or 5 times. Overall head maintenance is estimated as 40 to 50% less than with the 6-chain head.



Consult a Joy Engineer



JOY MANUFACTURING COMPANY

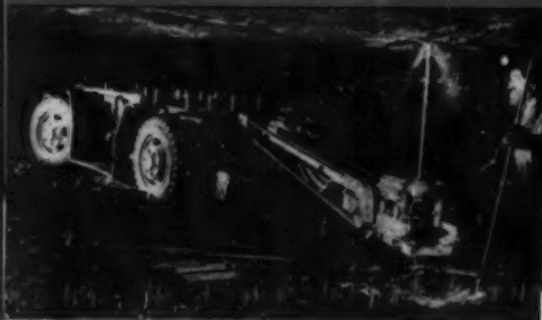
GENERAL OFFICES: HENRY W. OLIVER BUILDING • PITTSBURGH 22, PA.

IN CANADA: JOY MANUFACTURING COMPANY (CANADA) LIMITED, GALT, ONTARIO

ONE-MAN OPERATED . . . SELF-PROPELLED

. . . AND WITHOUT AN EQUAL FOR FAST,

ECONOMICAL ROOF-BOLT DRILLING



HYDRAULIC IMPACT WRENCHES



DRILL-MOUNTED HAND-HELD

The **JOY RBD-1 HYDRAULIC ROOF-BOLTING DRILL**

- ★ Built in 26", 30" and 36" heights. Wherever rotary drills are applicable, the RBD-1 consistently out-drills other types—either pneumatic or electric—producing as many as *two-thirds* more holes per shift.
- ★ Bottoms your roof-bolting holes with only one steel change in practically all cases. Except in the thickest seams, *no other drill* will do this.
- ★ Rubber-tired and self-propelled—equipped with hydraulic controls for *one-man* operation. Employs boom feed, and is self-leveling and self-aligning while drilling.
- ★ May be equipped for wet drilling—or with vacuum dust remover, as desired—to eliminate objectionable dust.
- ★ Hydraulic impact wrenches are available, either drill-mounted, feed-leg mounted, or hand-held types. All types derive their power from the machine—have ample torque to drive nuts to refusal.
- ★ SULMET Carbide Bits and Drill Steels designed for the RBD-1 Drill are available.

Consult a Joy Engineer



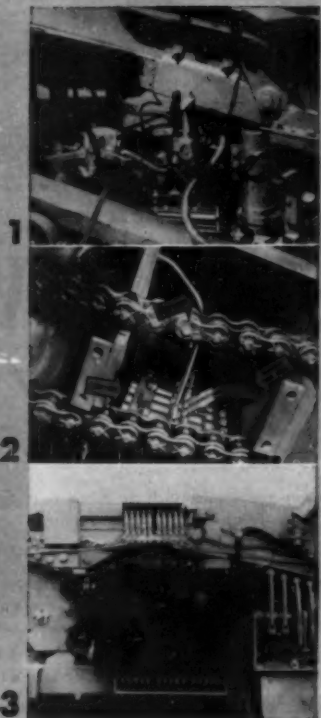
JOY MANUFACTURING COMPANY

GENERAL OFFICES: HENRY W. OLIVER BUILDING • PITTSBURGH 22, PA.

IN CANADA: JOY MANUFACTURING COMPANY (CANADA) LIMITED, GALT, ONTARIO

Lincoln's automatic centralized lubrication systems

reduce bearing wear
on COAL LOADERS through
*applying the RIGHT LUBRICANT,
in the RIGHT QUANTITY,
at the RIGHT TIME*



Coal loaders offer a typical example of how installation of a Lincoln Centralized System permits continuous and speeded up operation of underground mining machinery, sharply reducing power and lubricant consumption, and reducing bearing wear to a minimum.

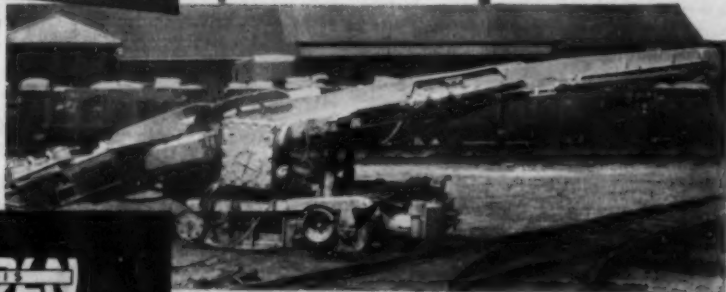
Mine operators who have installed Lincoln Systems on coal loaders report such savings as a reduction of 50% in lubricant used, no bearing failures, and reduced labor cost of one man-hour per eight hour shift.

Similar savings have been recorded for Lincoln installation on strip mining machinery and tipples.

For additional information, write for bulletin number 680.

1. Joy Loader, 11 BU, equipped with a Lincoln Automatic Centralized System. The lubricant pump is hydraulically powered and works in series with the hydraulic system operating the loader.
2. Lincoln Model 1820 Hydra-Luber® Pump as installed on a Joy Loader. Each time the hydraulic valve on the machine is actuated to swing conveyor to the left, the Hydra-Luber automatically cycles the lubrication system.
3. Drip lubrication of chain drives on Goodman Loader is accurately and efficiently provided by the Lincoln System.
4. Location of Lincoln injectors on a Myers Whaley Automat. They may be mounted on the machine singly, or in manifolds of two to five injectors. Each injector is connected to a bearing by flexible or rigid tubing, as desired.

4



*Registered Trademark

• • PIONEER BUILDERS

LINCOLN

LUBRICATING EQUIPMENT • •

LINCOLN ENGINEERING COMPANY

5729 Natural Bridge Avenue • St. Louis 20, Missouri



This advertisement appeared in leading newspapers September 12. It is the first of a series in behalf of a modern highway system.

We Must Face the Highway Crisis Now —there is only one real cure!

ONE of the greatest home-front threats to the welfare of every American is the congestion on our highways today.

It is not only a menace that costs thousands of lives in needless accidents and millions of dollars in wasted time every year—it is a *peril to national security!*

Without motor transportation the nation would stagnate. It has become the lifeblood of America's economy. The highways are its arteries—and they are hardening fast!

Remember these facts

Motor transport now carries 80% of all interstate passenger traffic — takes more than 50% of all workers to their jobs.

It speeds 90% of all foods to market—hauls 75% of all general freight.

It is the swift plant-to-plant conveyor of raw materials, parts and subassemblies that keeps America's mass-production lines going—that makes America's unprecedented prosperity possible.

Roads are the bottleneck

To keep America moving today requires the daily use of almost FIFTY MILLION motor cars, trucks and buses — more motor vehicles than all the rest of the world possesses!

Yet this vital transport system is now jam-packed into an obsolete highway system—most of it designed *pre-war* to comfortably accommodate less than half today's vehicular mileage!

And motor registrations have been soaring since the war at the rate of 3.7 million per year.

We should have action NOW!

We cannot cut this Gordian knot by restrictive laws. The crux of the problem is not the number of cars or the size of trucks—it is *too few modern roads!*

To keep our nation mobile, we must start building a new national highway system now, designed for modern traffic needs and speeds.

Such a modern road system is essential to our prosperity and vital to our defense in this atomic age. And we have the world's most efficient road-building industry equipped to construct it in less time than ever possible before.

The time has come when we must do something about better roads besides talk. The demand for action must come from everyone who uses the highways—and that's just about everybody.

P. M. Litchfield
Chairman of the Board
THE GOODYEAR TIRE & RUBBER COMPANY, INC.

GOOD YEAR
THE GREATEST NAME IN RUBBER



YOU S-T-R-E-T-C-H

THIS WAY...

Unlike the housewife who uses bread crumbs and other materials to "stretch" the available supply of hamburger, Simplex is not able to add materials to copper to make it go further. We do achieve the same result, but by an entirely different means. Our way is to insulate the copper with Simplex-Anhydrex XX high voltage insulation. It is the very best "copper extender" that we know.

Simplex-Anhydrex XX is a product of Simplex research and development. It is an insulation that is absolutely "tops" in the high voltage field. It is designed to operate at a maximum of 167° to 176°F. (75° to 80°C.) copper temperature, depending on operating conditions. It has all the properties you want in such a high voltage rubber insulation. It will withstand heat.

It also withstands ozone and aging, and it is guaranteed not to absorb more than 15 milligrams of water per square inch of exposed surface when tested in accordance with U. S. Coast Guard standards.

So far as we know it is the only insulation of its kind. Use it wherever you have a high voltage problem, whether the cables are to be installed directly in the earth, underground in ducts, under water, or overhead supported from messenger wire.

You can help to "s-t-r-e-t-c-h" the small available supply of copper by insisting that your high voltage cables be insulated with Simplex-Anhydrex XX insulation. Do you want to know more about this unique insulation? Then fill in the coupon below.



SIMPLEX-ANHYDREX XX

SIMPLEX WIRE & CABLE CO.
79 Sidney St., Cambridge 39, Mass.

SIMPLEX WIRE & CABLE CO.
79 SIDNEY ST., CAMBRIDGE 39, MASS.
GENTLEMEN: PLEASE SEND A COPY OF BOOKLET 1008A TO:

NAME _____ TITLE _____
COMPANY _____
STREET _____
CITY _____ STATE _____

NO-TURN shuttle haul..



Dumptors®

On every haul cycle, Koehring fast-shuttling Dump-tors eliminate slow turns — at the loading unit, at the dumping point, on sharp, "zig-zag" grades. They gain more productive haul time, because Koehring constant-mesh transmission gives the same 3 fast speeds forward and reverse. Here's how much no-turn shuttle operation can increase your production:

SAVE TURN TIME GAIN HAUL TIME

By eliminating only 2 turns on a 1,000' haul, time studies prove that Dump-tors can save 30 seconds every round trip, and increase hourly yardage output over 10% per unit. What's more — fast, easy spotting and 1-second gravity dump keep production high.

Remember, too — top hauling efficiency also means increased shovel output. For double profit protection, team fast-shuttling Dump-tors with Koehring heavy-duty excavators. Four sizes: ½-yd., ¾-yd., 1½-yd., and 2½-yd.

KOEHRING

COMPANY

MILWAUKEE 16, WISCONSIN

Distributors: JOHNSON • PARSONS • KWI-MIN

It will pay you to get complete facts from your Koehring distributor. Call him NOW.

KJ4

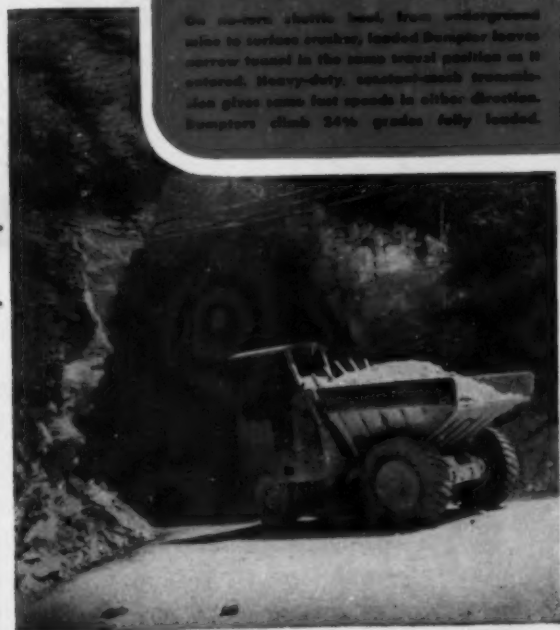
. in open pits or underground



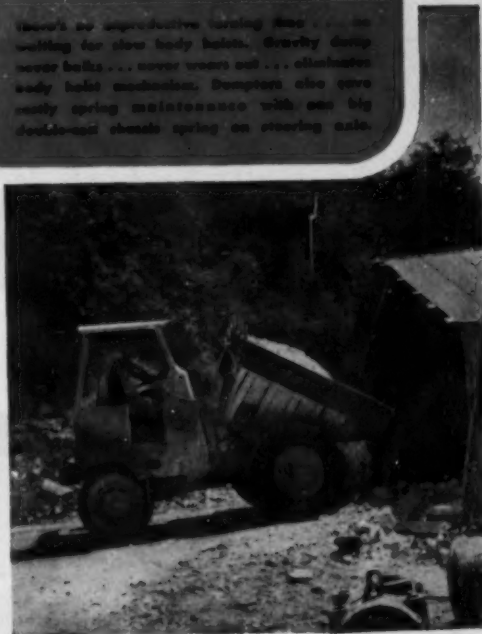
In confined underground operation, Dumper spots fast, close to shore . . . no need to turn. 17 ft. front, 8 ft. 6 in. body permits loading over either end or sides. Travel operator has easy walk target, and short swing. Innovator, shown above with Dumper is a Kooking 16-yard 304.



At dumping location there's no slow pivoting around to avoid passageway. Dumper drives up to conveyor, body forward . . . operator hits body release lever . . . gravity dumps forward load in 1 second, and Dumper is ready to head back for next load, without turning around.



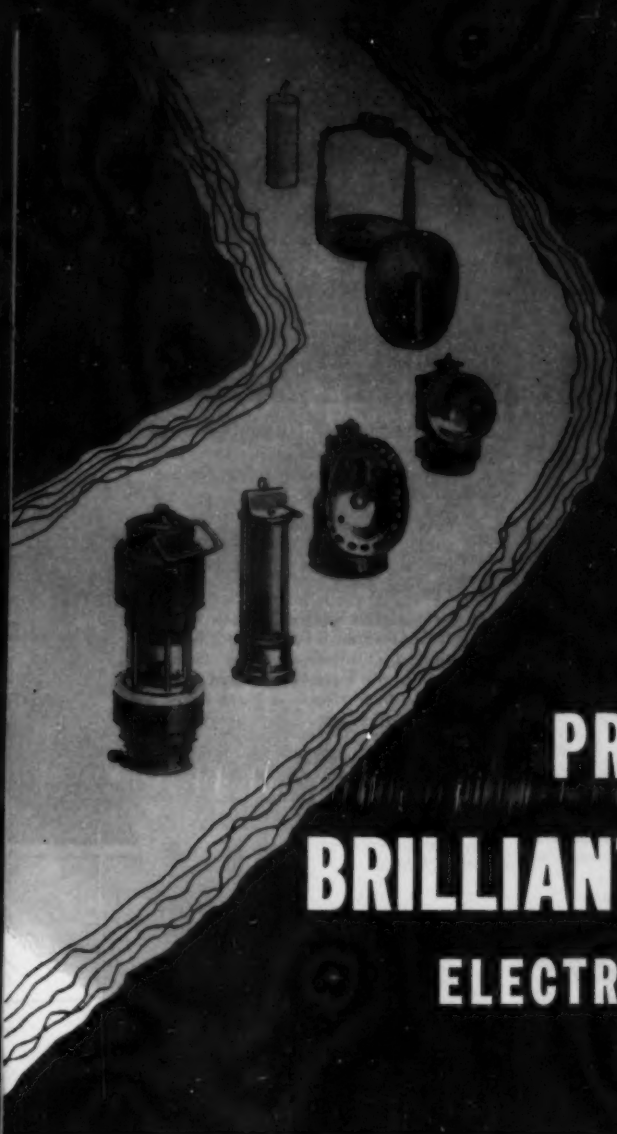
On no-turn, shuttle head, from underground mine to surface crusher, loaded Dumper leaves narrow tunnel in the same travel position as it entered. Heavy-duty, constant-mesh transmission gives some fast speeds in either direction. Dumpers climb 34% grades fully loaded.



There's no unproductive turning time . . . no waiting for slow body halt. Gravity dump never balks . . . never wears out . . . eliminates body halt maintenance. Dumpers also give easy spring maintenance with one big double-end shock spring on steering axle.

Light
for the night





PRESENT BRILLIANT EDISON R-4 ELECTRIC CAP LAMP

It took over two centuries to bring miner's light from the dim, flickering candle of the 1700's to the vital mining tool it is today—and the last 35 years have seen more important advancements than the previous 200. The introduction of the Edison Electric Mine Lamp in 1915 played a vital part in making mechanized mining methods possible by providing *more and better light* with each step forward.

Today, the brilliant, unfailing beam of the Edison Model R-4 lamp, stepped up in intensity to meet the

greater illumination needs of modern mechanized mining, lights the way to greater safety and production. Its design and construction keep it on the job, shift-after-shift, month-after-month, for years. It requires less handling, fewer man-hours to maintain, and to service.

Write for bulletin M-19 for complete details, or let us arrange an actual demonstration at your convenience.



MINE SAFETY APPLIANCES COMPANY

BRADDOCK, THOMAS AND MEADE STREETS, PITTSBURGH 2, PA.

At your Service 67 Branch Offices in the United States and Mexico

MINE SAFETY APPLIANCES CO. OF CANADA LIMITED

Toronto, Montreal, Calgary, Winnipeg, Vancouver, New Glasgow, N. S.

Cable Address: "Mines" Pittsburgh

EIMCO Coal Dewatering Filters Accomplish TWO Purposes

The installation of EIMCO fine coal dewatering equipment in modern coal preparation plants has accomplished a two-fold purpose for the user:

1. Fine coals are dewatered and sold. This reclaimed product has been turned into a profit making asset.
2. Water discharged from the EIMCO Filter is clear and free of objectionable matter. This solves the problem of complying with the various State Anti-pollution laws.

Every Eimco is backed by more than half a century of experience and service to the mining industry.

Write for more information on EIMCO fine coal dewatering filters. You can't beat an EIMCO.

View of Eimco's filtration laboratory, operated in conjunction with its New York office.

Eimco's Trained Technologists help customers make a study of their filtration problems and select machines best suited for the operation.



EIMCO

THE EIMCO CORPORATION

The World's Largest Manufacturers of Underground Rock Loading Machines.
EXECUTIVE OFFICES AND FACTORIES - SALT LAKE CITY 10, UTAH, U. S. A.

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EL PASO, TEXAS: MILLS BUILDING • BERKELEY, CALIFORNIA: P. O. BOX 190
KEESLGGG, IDAHO: 307 DIVISION ST. • LONDON: W. 1, ENGLAND: TWO RICCABLY

IN FRANCE: SOCIETE EIMCO, PARIS, FRANCE

IN ENGLAND: EIMCO (GREAT BRITAIN) LTD., LONDON, ENGLAND

AGENTS IN ALL PRINCIPAL CITIES THROUGHOUT THE WORLD

MINING MACHINE CABLES

**For cables that stay on the job longer . . .
ROEBLING!**

THE JACKETS of Roebing Roeprene Mining Machine Cables are "lead-mold" cured to assure that all components of the cables are firmly held in place. The finished product has exceptional dielectric and physical strength . . . the tough outer surface is highly resistant to water, sunlight checking, acids, alkalis, oil and grease.

But more than that, every feature of these cables contributes to maximum flexibility and service life. Their neutral, for instance, is made of flat, braided copper which provides the ultimate in elongation and flexibility in any direction. And the neutral is covered with braided cotton to cushion and reduce abrasive action between copper and insulation. Service experience has proven this Roebing design so effective that it is now being widely imitated.

Large quantities of Roebing's full line of electrical wires and cables are called for in the national rearmament program. The Roebing organization and distributors will always, however, give you the best service and deliveries within their power. John A. Roebing's Sons Company, Trenton 2, New Jersey.

Conductors are tinned or Amaloy-coated copper . . . extra flexible stranded.

Insulation RH-SW made of heat- and moisture-resistant synthetic rubber.

Reinforcing open seine twine weaves on each individual conductor binds the insulation and the jacket into one integral unit . . . provides greater flexibility . . . greater resistance to wear.

Jacket is lead-cured Roeprene . . . meets ASTM specification D-732.

All Roebing Roeprene Mining Machine Cables are approved by the Pennsylvania Bureau of Mines Approval P-111, and comply with the requirements of the U.S. Bureau of Mines for flame-resistant mining cables.



ROEBLING

Atlanta, 934 Avon Ave • Boston, 31 Sleeper St • Chicago, 5525 W. Roosevelt Rd • Cincinnati, 3233 Franklin Ave • Cleveland, 701 St. Clair Ave, N.E. • Denver, 4801 Jackson St • Houston, 4216 Navigation Blvd • Los Angeles, 216 S. Alameda St • New York, 19 Rector St • Odessa, Texas, 1920 E. 2nd St • Philadelphia, 230 Vine St • San Francisco, 1740 17th St • Seattle, 950 1st Ave, S. • Tulsa, 321 N. Chayenne St
Export Sales Office, Trenton, N. J.





CUTTING CHAIN AND BITS



*Help for you
in maintaining any
production pace without
costly breakdowns
and replacements--*

Here is that smooth running Prox Cutting Chain that requires less power yet is doing that all important job of cutting costs and speeding production for many operations.

The bit is held by one moving part and rivets are eliminated thru the use of a strapless chain. One of the features of this chain is in design that permits replacement of parts in a matter of minutes.

This chain was designed and engineered as a result of years of contact with cutting machines and chain problems. The net result to you is the very finest in efficiency with modern cutting machines.

The Prox Tool Steel Bits are known for their ability to stand up under heavy abuse. Each of these Tool Steel points cuts at least as much as a hard tipped ordinary mine bit.



FRANK **PROX** COMPANY, INC.

PROX
ON THE BANKS OF THE WABASH ~ SINCE 1873

CUTTER BARS

Rigid Construction for Long Life

Points 3, 4 and 5 give you an idea of the durability that is built into Prox Cutter Bars. Here is construction that you can depend upon for the kind of service that results in exceptionally low cost performance. You get years of trouble-free service because these cutter bars can take it without bending or breaking.

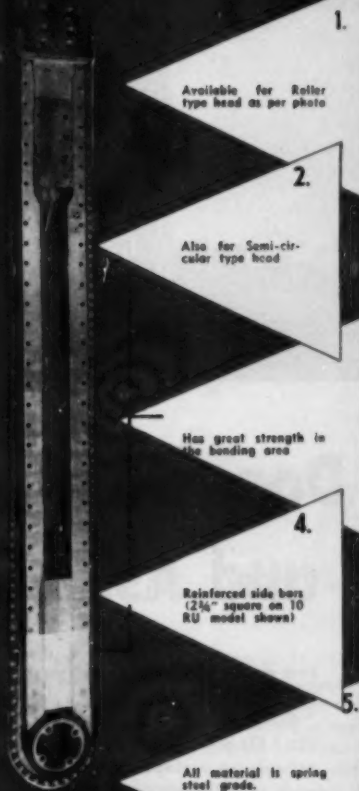
PROX Cutter Bars are tested products having served efficiently, in the past years, under varying conditions.

These Cutter Bars are furnished for using three types of cutter heads. The Prox Roller Cutter Head, the Prox Semi-Circle Cutter Head, and the Prox Semi-Circle Shoe Type Cutter Head. The Bars are furnished equipped with water upon request for a slight additional cost.

PROX Cutter Bars are made for all modern types of cutting machines.

Investigate PROX products—see why they give you the kind of service demanded by modern production. Let's talk it over.

TERRE HAUTE, INDIANA





It Does So Much... and Asks So Little



Ever stop to think how much your Bethlehem wire rope does for you in a day's time?

Ever compute the tremendous tonnages it lifts? Or the number of heavily-loaded cars it hauls up a slope? Or the cubic yards of rock it helps dig out of the ground and move from place to place?

The work it does is pretty stupendous. Yet its demands are simple. Give it just ordinary

care and you'll find it sticks with you . . . moving those tonnages week after week, month after month.

True, you have to replace it once in a while. Even Bethlehem rope won't last forever. But for every dollar it costs, it gives you in return a whopping big dollar's worth of service. You can't make a better buy in wire rope . . . anywhere.



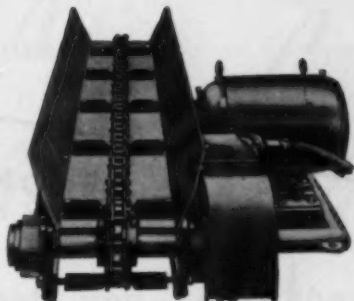
BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. Export Distributor: Bethlehem Steel Export Corporation

When you think WIRE ROPE . . . think BETHLEHEM

Better Engineered CHAINS

... Another of the many reasons why there's nothing on the market to match the



JOY MODEL FA ROOM CONVEYOR

THREE CHAINS AVAILABLE - A TYPE TO SUIT YOUR NEED



C-60
STANDARD CHAIN
19,000#



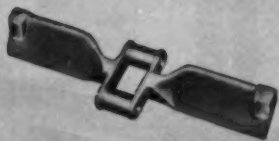
C-60
HEAT TREATED
25,000#



H-79
PROMAL CHAIN
27,000#



C-60 Chain Parts Showing Double
Lock on Chain Pin



Flight for C-60 Standard or
Heat-Treated Chain



Flight for H-79 Promal Chain

The Model FA is the last word in Chain Conveyors. It not only brings you the advantages of simple V-belt drive, more efficient speed reducer, 500 lbs. less weight, 4 sq. ft. less base area, and easy reversibility. In addition, three new Joy-engineered chains are available: the C-60 with malleable block links (19,000 lbs. ultimate strength); the C-60 fully heat-treated (25,000 lbs. strength); and the H-79 Promal heat-treated pintle-type chain,

which has an ultimate strength of 27,000 lbs.

All three chains have drop-forged flights integral with the link. The H-79 is also available with a detachable flight. Other superior features of FA Conveyors include an exclusive, non-jamming gravity take-up for the chain, and a ball-bearing mounted shear-pin sprocket which continues rotating and cannot damage either the head-shaft or the sprocket bore if the pin shears. • Write for Bulletin LD-200.

Consult a Joy Engineer



JOY MANUFACTURING COMPANY

GENERAL OFFICES: HENRY W. OLIVER BUILDING • PITTSBURGH 22, PA.

IN CANADA: JOY MANUFACTURING COMPANY (CANADA) LIMITED, GALT, ONTARIO

MEMO FROM FOREMAN

Jim -

Kelly, of Purchasing Dept.,
phoned while you were out.
Said he appreciated your note
about fine performance of
Bethlehem track bolts, and
would be pleased to reorder
from Bethlehem.

Al



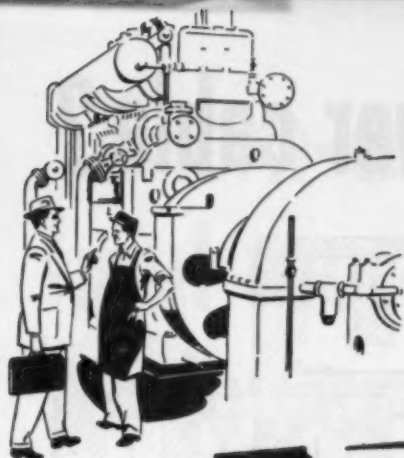
BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast
Steel Corporation. Export Distributor: Bethlehem Steel Export Corporation



Other Bethlehem Fasteners for the Mine

SPIKES • RIVETS • THREADED RODS • ROOF BOLTS AND ACCESSORIES • STANDARD BOLTS AND NUTS



We get the

facts first

then help you choose the correct

Ashland

special

DIESEL

fuels and lubricants

Ashland sales engineers are continually working with operators of all types of diesel equipment to improve operation and reduce maintenance costs. Often called in for trouble-shooting, their wide experience has proven valuable in arriving at a solution.

Where proper fuels are the problem, Ashland has the answer. Ashland sales engineers can prescribe the type and grade proved best for every engine and operating condition. Our refinery blending processes can supply most any combination of fuel components.

If it's proper lubrication, Ashland again has the answer. The Ashland group of refineries produces a large selection of lubri-

cants. Crude oil supplies come from many sources, including the finest Pennsylvania and mid-continent crudes. Our lubricating chemists are continually improving and developing new formulas based on the experience of one of the oldest and best-known lubricating plants in the industry. Call on our sales engineering staff any time. Give them the facts and they'll come up with the answer.

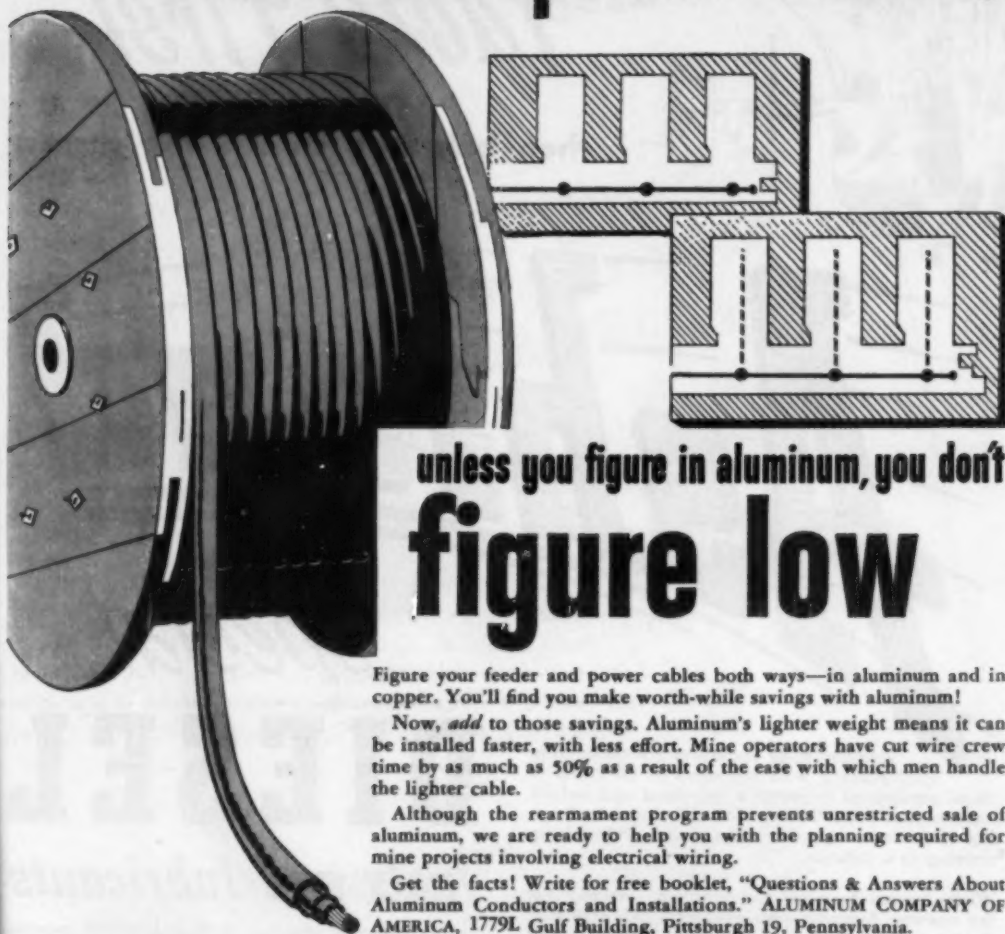


...complete line of lubricants for diesel equipment

ASHLAND OIL & REFINING COMPANY
ASHLAND, KENTUCKY

SUPPLY TERMINALS: Ashland, Ky. — Buffalo, N. Y. — Canton, O. — Cincinnati, O. — Cleveland, O. — Erie, Pa. — Evansville, Ind. — Findlay, O. — Gallensbee, W. Va. — Freedom, Pa. — Kenova, W. Va. — Kobuta, Pa. — Louisville, Ky. — Marietta, O. — Nashville, Tenn. — Niles, O. — Paducah, Ky. — Pittsburgh, Pa. — St. Elmo, Ill. — St. Louis, Mo. — Toledo, O.

adding **feeder and power cable?**



unless you figure in aluminum, you don't
figure low

Figure your feeder and power cables both ways—in aluminum and in copper. You'll find you make worth-while savings with aluminum!

Now, *add* to those savings. Aluminum's lighter weight means it can be installed faster, with less effort. Mine operators have cut wire crew time by as much as 50% as a result of the ease with which men handle the lighter cable.


Although the rearmament program prevents unrestricted sale of aluminum, we are ready to help you with the planning required for mine projects involving electrical wiring.

Get the facts! Write for free booklet, "Questions & Answers About Aluminum Conductors and Installations." ALUMINUM COMPANY OF AMERICA, 1779L Gulf Building, Pittsburgh 19, Pennsylvania.

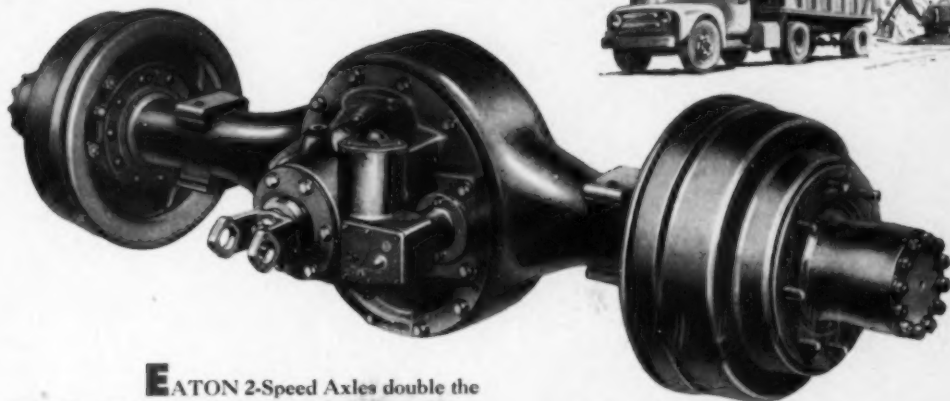


Aluminum Conductors



of **ALCOA**  **ALUMINUM** are made by leading manufacturers

Eaton-equipped Trucks haul more, faster, longer, at lower cost!



EATON 2-Speed Axles double the number of available gear ratios, providing a combination of power and speed that makes for faster trips with full loads; more pay-load miles at lower cost per mile. Drivers select the ratio best suited to road, load, and traffic conditions—a gear ratio for maximum efficiency, economy, safety, and maneuverability. Using the right gear ratio for each situation permits engines to run in the most efficient and economical speed range. Stress and wear are reduced, not only on the axles themselves, but on engines and all power transmitting parts; adding thousands of miles to vehicle life, keeping trucks on the job and out of the repair shop. Eaton Axles more than pay for themselves—in lower maintenance and operating costs, and in higher trade-in value. For complete information, see your truck dealer.

Axle Division

EATON MANUFACTURING COMPANY
CLEVELAND, OHIO

**These Eaton Features Keep Trucks
on the Job, Reduce Upkeep, Add
Thousands of Miles to Axle Life**

- PLANETARY GEARING
- FORCED-FLOW LUBRICATION
- RUGGED CONSTRUCTION

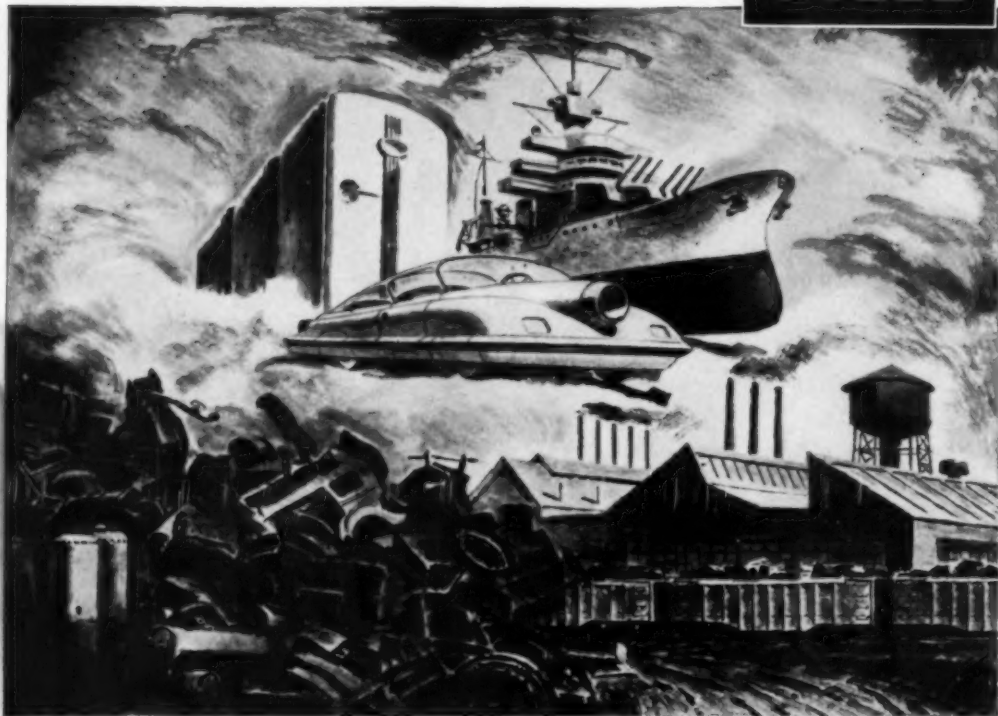
EATON *2-Speed Truck* **AXLES**



PRODUCTS: Sodium Cooled, Poppet, and Free Valves • Tappets • Hydraulic Valve Lifters • Valve Seat Inserts • Jet Engine Parts • Rotor Pumps • Motor Truck Axles • Permanent Mold Gray Iron Castings • Heater-Defroster Units • Snap Rings • Springtites • Spring Washers • Cold Drawn Steel • Stampings • Leaf and Coil Springs • Dynamatic Drives, Brakes, Dynamometers

**LET'S BUILD THOSE
CRUISERS • CARS • REFRIGERATORS
HIDING IN YOUR OPERATION!**

**J&L
STEEL**



**How much scrap is
wasting away in your Plant?**

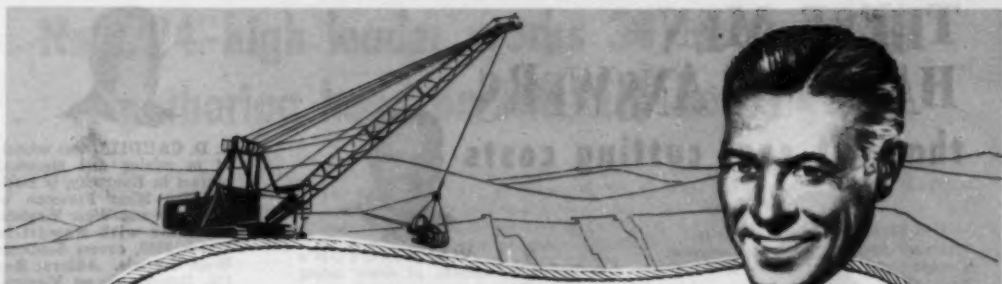
Yes... hiding... gathering dust... rusting away! Whatever your business, you probably have more scrap iron and steel laying around your plant or operation than you imagine. Today, this scrap is one of America's most precious raw materials. It is needed urgently—every single ton saves vital ore. Get your scrap in. *Maximum quotas of steel cannot be obtained without it.*

Check NOW. Look for obsolete iron and steel machinery... fixtures... chains... broken parts—any old metal that's just gathering dust. Get it all together, call your scrap dealer. He'll pay you for it and get it back into production. Do it right away.

SCRAP IS YOUR BUSINESS, TOO!

JONES & LAUGHLIN STEEL CORPORATION
PITTSBURGH 30, PA.





FOR LONGER LIFE...GREATER SAFETY AND ECONOMY

Lubricate Wire Rope

WITH

LEADOLENE

Klingfast

By combining corrosion and abrasion protection with vastly superior lubrication, LEADOLENE KLINGFAST can extend wire rope service by as much as two to four times. Widely used in the manufacture of wire rope, this lubricant prevents moisture and other corrosive influences from penetrating into the wires and strands . . . and also protects against sand, coal dust, coke, water, mud, sulphurous contamination, and other abrasives. It provides ample protection even in the presence of acid fumes and salt water spray. Since LEADOLENE KLINGFAST does not wear off easily, it is applied less frequently than ordinary lubricants.

For greater economy and longer service life, use LEADOLENE KLINGFAST in daily service . . . and insist upon new wire rope that has been lubricated with it during manufacture.

"I.P. . . . "Indestructible pH-film" capable of withstanding pressures up to 50,000 psi.

Write Today for Free Sample

THE "IP"*
LUBRICANT

The Brooks Oil Co.

Since 1876

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Executive Sales Offices . . . PITTSBURGH, PA.
Canadian Offices and Plant . . . HAMILTON, ONTARIO

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Calumet (Montreal District)	Quebec
	Santiago de Cuba

THESE MEN* HAVE THE ANSWERS that cut coal cutting costs



RANDAL LEACH began his career with the electrical crews at South East Coal while in high school. After two years at Lees Jr. College at Jackson, Kentucky and two at mechanical and electrical engineering at University of Kentucky, he returned to that firm; joined the Bowdil organization in 1937. Covers the Middle West, lives at 1004 East St. Louis St. in West Frankfort, Ill. Telephone 675.



V. L. WALKINGTON's advancement of chain lacing ideas have overcome many Western conditions. In 1933, when Vic joined Bowdil, he brought a fine record of 25 years electrical welding, drafting and laying-out experience. Lives at Helper, Utah, covers Utah and part of Western Colorado.



E. D. CAUDILL was schooled in mining and electrical courses in Kentucky, is certified for Mine Foreman in Kentucky and West Virginia. Ed came with Bowdil in March 1937, covers Southern West Virginia. Address Box 132, Danville, West Virginia, you reach him by telephone 336 W. Madison, West Virginia.



JOS. M. BLASCO brought a lifetime of mining knowledge to Bowdil when he became a representative in May 1933. A graduate of L. C. Cook Engineering School, Chicago, Joe almost completed the I. C. S. course in Engineering, too. He covers Pennsylvania entirely, calls Charleroi, Pa. home, where his residence is at 435 McKean Avenue, and the phone Charleroi 34628.



WILLIAM D. RADCLIFFE went west from Kentucky, stopped to learn his trade at Chicago School of Electrical Engineering... then on to Sheridan, Wyoming in 1901 as Chief Electrician for the Carnie Coal Company where he installed the first electrical mining machine in the area. Another first was the electrical machine at Roundup, Montana for the Milwaukee R. R.'s Republic Coal Co. Joined Bowdil in 1932; covers the Rocky Mountain Area including Colorado, New Mexico, Montana, North Dakota and Wyoming. Customers in the West enjoy the Radcliffe's hospitality at 761 Steele St., Denver, Colorado. Telephone EA-7151.



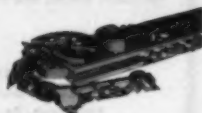
C. W. (PETE) WEISBURN earned his first State of Ohio Mine Foreman papers after three years in Mine Engineering at Ohio State University. A veteran of all types of mine operation, Pete joined Bowdil in 1945, covers Ohio and into West Virginia direct from the Canton factory—not far from his home in Magnolia, Ohio. Telephone Magnolia 2166.



A. J. LEACH began his mining days with a pick, then operated the first Breast Machines to come to the Tom Corwin Coal Company at Wellston, Ohio, and Superior Coal at Jackson, Ohio in 1900. Has operated machines in all types of seams in Ohio, Kentucky and West Virginia with a rich background of experience from 3 years as Mine Foreman and 15 as Superintendent of South East Coal Company at Seco, Kentucky. Joining Bowdil in July 1933, Leach covers Eastern Kentucky, lives on Sand Lick Road in Whitesburg. Telephone 2232.

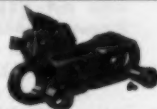
BOWDIL CUTTER BAR

Bowdil Cutter Bars are designed for extra strength and power saving. Rivet-free body, Z bar construction, wide wearing strips make it the sturdiest bar in mining. Bowdil Bars are standardised to fit all coal mining machines.



FABRI-FORGED CHAIN

Lower your operating costs with Bowdil Fabri-Forged Chain. Rugged, easy to maintain, the drop-forged lug body stands up under heavy wear with breakage practically eliminated. A major improvement is the true-running radial track guide.



The BOWDIL COMPANY

CANTON, OHIO

New 24"-high loader works 30" seams with gathering head on TIMKEN® bearings

WITH this new Joy Manufacturing Company 24"-high, 20BU Loader, it is now possible to get coal out of shallow seams only 30" high. It has a capacity of 5 to 8 tons per minute, and incorporates a completely new type gathering head that is equipped with 24 Timken® bearings. The new gathering head has a bevel gear drive which makes the unit very rugged and very quiet.

Twelve more Timken bearings are used throughout the loader at vital spots. Timken tapered roller bearings keep gears and pinions meshing smoothly and accurately. Friction is minimized.

Because of tapered design, Timken bearings carry both radial and thrust loads. Shafts are held in proper alignment, reducing wear on moving parts. Due to line contact between rollers and races, Timken bearings have extra load-carrying capacity. Frictionless operation is assured by their true rolling motion and incredibly smooth surface finish.

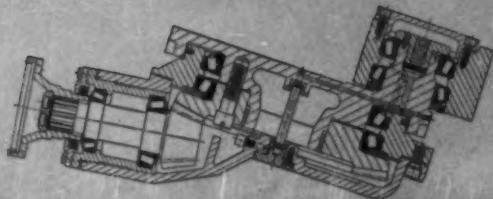
Timken bearings make closures more effective because they hold housing and shaft concentric—dirt and coal dust are kept out; lubricant kept in. Lubrication time and maintenance are kept to a minimum. Timken bearings are made of Timken fine alloy

steel and case-hardened for maximum wear resistance. Normally they last the life of the machine.

On any machine you build or buy, be sure to ask for Timken bearings. Over 50 years of bearing research and development have made them first choice in industry. Look for the trade-mark "Timken" on every bearing. The Timken Roller Bearing Company, Canton 6, Ohio. Canadian plant: St. Thomas, Ontario. Cable address: "TIMROSCO".



This symbol on a product means its bearings are the best.



Now JOY MANUFACTURING COMPANY mounts the gathering head of its new 20BU Loader on Timken roller bearings for long life with minimum maintenance.

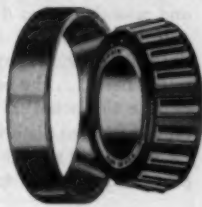


WE MAKE OUR OWN STEEL


The special grade alloy steel which gives Timken bearings their strength and resistance to wear is made in our own steel mills.

The Timken Roller Bearing Company is the acknowledged leader in: 1. advanced design; 2. precision manufacturing; 3. rigid quality control; 4. special analysis steels.

TIMKEN
TRADE-MARK REG. U.S. PAT. OFF.
TAPERED ROLLER BEARINGS



NOT JUST A BALL NOT JUST A ROLLER THE TIMKEN TAPERED ROLLER BEARING TAKES RADIAL AND THRUST LOADS OR ANY COMBINATION



we've split
the case
wide open...

... for proof of better pumping performance!

It's been said that split-case centrifugal pumps look pretty much alike. But looking alike does not mean "like" performance!

We've lifted the casing of a Fairbanks-Morse Single-Stage Split-Case Centrifugal to show you why you get better performance... lower maintenance costs with Fairbanks-Morse... to show you important design and manufacturing differences.

Note the sturdy construction and exceptional strength provided by the arched casing and solid pump base... the ease with which the entire pump can be inspected or the entire rotating element removed without disturbing driver or pipe connections. Exceptionally smooth water passages reduce friction and "back eddies" to the minimum. Bearing brack-

ets, cast integrally with pump body, maintain accurate, permanent alignment of shaft and impeller. Smooth, one-piece impeller reduces wear and maintains efficiency. Impeller is pressed on shaft over a key so that the key also drives the shaft sleeves and prevents destructive rotation of the sleeve on the shaft. Removable casing and impeller wearing rings assure easy maintenance and have streamlined water guiding surfaces for maximum pump efficiency.

These are but a few of the many performance-making features you'll find in Fairbanks-Morse Centrifugals. Your Fairbanks-Morse Pump expert will be happy to give you the complete story on these efficient, economical pumps. See him or write Fairbanks, Morse & Co., Chicago 5, Illinois.



FAIRBANKS-MORSE,

a name worth remembering

PUMPS • SCALES • ELECTRIC MOTORS
GENERATORS • LIGHT PLANTS • DIESEL,
DUAL FUEL AND GASOLINE ENGINES

FAST UNLOADING



**ALLIS-CHALMERS
CAR SHAKER**

...and Sturdy Construction

BESIDES BIG SAVINGS in man-hours and demurrage costs, operators report savings in maintenance and downtime with Allis-Chalmers car shakers. And no wonder! Allis-Chalmers has designed these units for long, dependable service without trouble. For example:

- ▶ Shaker body is one-piece, all-welded structure made of 1 in. thick reinforced steel plate and stress-relieved to eliminate welding strains.
- ▶ Motor and drive are totally enclosed within shaker body, protected from weather

and accidental injury. Motor is mounted in a special cradle base and protected from vibration damage with multiple shear mountings.

- ▶ Extra large bearing — 11 $\frac{1}{8}$ in. outside diameter. Long bearing life! Heavy duty shaft arranged for hydraulic bearing removal.

Get more facts about how Allis-Chalmers car shakers can save money in your operations. Call the A-C representative in your area. Allis-Chalmers, Milwaukee 1, Wisconsin.

Car Shakers Promote Safety to Personnel



ALLIS-CHALMERS

Allis-Chalmers Mfg. Co.
Milwaukee 1, Wis.

Please send my copy of Car
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DUPLEX BIT



CINCINNATI DUPLEX CHAIN

CINCINNATI Chains Bits and Bars Used in America's Foremost Mines

Cincinnati Coal Cutting Equipment such as illustrated above is performing with maximum efficiency in an ever increasing number of mines in this country and abroad. Illustrated is a Cincinnati No. 6 Thin Kerf Chain and Cincinnati No. 2353-A Thin Kerf Cutter Bar operating in 26" to 28" coal seam.

OUR BEST ADVERTISING COMES FROM OUR CUSTOMERS

TOP PERFORMANCE of Cincinnati Coal Cutting Equipment year after year in Mine after Mine in this country and abroad has built more new business and more repeat business than anything we might say. We want to take this opportunity, however, to point out that Cincinnati Coal Cutting Equipment is well engineered and ruggedly constructed . . . that it uses less power . . . increases production . . . provides larger cuttings . . . and decreases machine maintenance costs. Summarizing expressions from our customers, the Cincinnati Chain is virtually trouble-free and is popular with management, machine runners and maintenance men.



Cincinnati Bars are specially designed to operate under all cutting conditions and will fit all types of cutting machines.

THE CINCINNATI MINE MACHINERY CO.

2983 SPRING GROVE AVENUE • CINCINNATI, OHIO



Whatever equipment you prefer,
here's the secret of

LOW-COST POWER

When choosing your fuel, always keep these three factors in mind:

1. **The types available.** Along the Baltimore & Ohio, you're sure to find the type that exactly meets your needs. The modern mines in this area produce a wide variety of excellent Bituminous.
2. **Nearness to your plant.** With its 11,000 miles of track, the B&O offers efficient economic transportation to plants throughout the heart of industrial America.
3. **Reserves on hand.** Virtually limitless reserves of power-packed Bituminous lie in the vast B&O territory—a supply that will last for centuries.

For the secret of dependable, low-cost power as related to your specific needs, ask our man!

Bituminous Coals for Every Purpose



BALTIMORE & OHIO RAILROAD

Constantly doing things — better!

RUBBER-TIRED



LeTOURNEAU LEADERSHIP IN DOZERS

1 First LeTourneau dozer in 1926 ... in the quarter century since that time more than 30,000 job-proved LeTourneau dozers have been built and shipped all over the world ... far more than by any other manufacturer.

2 Universally preferred ... almost every major dirtmoving operation around the world includes a large number of LeTourneau rubber-tired dozers ... proof of acceptance, and ability to take punishment and help lower earthmoving costs.

3 Tournadozer was developed in 1946 ... put 'dosing on a high-speed basis ... eliminated truck wear and maintenance costs. You travel at 19 m.p.h. from job to job ... interchangeable attachments make it a year-round producer!

4 Reports received daily tell of outstanding performance of Tournadozers which have now been in the field all over the world for over 4 years. Some of these machines are operating 24 hours a day ... seven days a week ... year after year.



HIGH-SPEED, RUBBER-TIRED EXCAVATING

Tournadozer, Trademark Reg. U.S. Pat. Off. ML110M

TOURNADOZER...

applies high speed to coal mine dozing



Le Tourneau, pioneer in the use of rubber-tired construction equipment, has long realized the need for a high-speed, high-production dozer... a machine built as a unit that would overcome limitations of the slow-moving, crawler-tractor dozers. The Super C Tournadozer is *Le Tourneau's* answer. It is fast, mobile and powerful, incorporating new highs in speed, maneuverability, visibility. It's an all-surface, all-weather tool that goes anywhere... right now!

Tournadozer is revolutionary because its working principle is completely new and different. It is the **FIRST** heavy-duty dozer on rubber designed as a unit specifically for high-

speed, high-production, and lower-cost dozer work. It applies 186 h.p. engine to 4-wheel drive on 21.00 x 25 low-pressure tires... gets more work done: dozes overburden, cleans up around shovels, cleans coal seams, levels spoil banks, maintains haul roads, clears snow, handles other maintenance tasks.

Tournadozer's powerful 4-wheel drive gives almost 3 times the forward speed, plus reverse speeds far faster than most crawlers. Constant-mesh, "instant-shift" transmission eliminates time-consuming stops for gear changing. No loss of rolling momentum. Torque converter available to automatically apply the engine's 186 h.p. most effectively and smooth out shock loads.

Tournadozer's 100% mobility means that you now can work or travel anywhere. Hauling costs and loading delays are eliminated. An assignment a half mile away can be started in just a couple of minutes from "now."

Tournadozer's high speed, job versatility and 100% mobility will take care of more job assignments per day with fewer units. Each assignment is more quickly completed. On many applications a single Tournadozer often does work of two, sometimes three, crawler dozers. This ability to outperform slower equipment on both production and maintenance tasks can mean new profits for you. Contact your *Le Tourneau* Distributor for all the facts.

R. G. LeTOURNEAU, INC.

PEORIA, ILLINOIS

NOW!

Write for bulletin giving specific description of **TOURNADOZER** and reasons why it can get more work done around your strip pit or mine.



• HAULING • LIFTING • EQUIPMENT

**FOR TOP DRILLING EFFICIENCY
IN THE WAR ON HIGH COSTS**

COALMASTER SPIR-L-WELD AUGER

Spir-L-Weld Coalmaster Augers provide smooth, fast conveyance — clean holes — reduced strain on equipment and operator.

**SMOOTH
CONVEYING
SURFACE**



**Order from your nearest
Coalmaster distributor**

- Austin Powder Co.
Cleveland
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Harvey, Ill.
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- Illinois Powder Mfg. Co.
St. Louis; Salt Lake City
- Joy Manufacturing Co.
Main Office, Pittsburgh, Pa.
Subsidiaries and representatives in
37 countries
- Mobile Drilling, Inc.
Indianapolis, Ind.
- Salem Tool Company
Salem, Ohio

Write for New Coalmaster Catalog

Coalmaster Drill Bits, of special analysis steel, cut faster . . . stay sharp longer . . . slash power consumption to a minimum.

Coalmaster Hexanspeed Assembly, above right, is a full-proof, automatic coupling that speeds up auger changing — and increases productive time at the bore hole.

CENTRAL MINE EQUIPMENT COMPANY
ST. LOUIS 15, MO.

Lubricant storage and handling simplified!

GULF MINING MACHINE LUBRICANT

*does the job of 2 or 3 other lubricants
—and does it better*

When you use Gulf Mining Machine Lubricant, you can eliminate from 2 to 3 other lubricants depending on the type of equipment you operate. One lubricant for all points except the armature bearings means less confusion at the face, elimination of application mistakes.

At the same time Gulf Mining Machine Lubricant provides better protection for vital parts in cutting and loading machines. Here's why:

1. A heavy body that reduces leakage from housings and gear cases.
2. Superior lubricating value that insures less wear.
3. Exceptional adhesiveness that prevents throwoff or channeling.
4. Resistance to the washing action of water.
5. Equal effectiveness for plain and antifriction bearings and for gears in drives and transmissions.

To get the many benefits possible with this quality product, call in a Gulf Lubrication Engineer. Write, wire, or phone your nearest Gulf office today. Or send the coupon below.



Gulf Oil Corporation • Gulf Refining Company CA
719 Gulf Building, Pittsburgh 30, Pa.

Please send me, without obligation, a copy of your new pamphlet "Gulf Mining Machine Lubricant II."

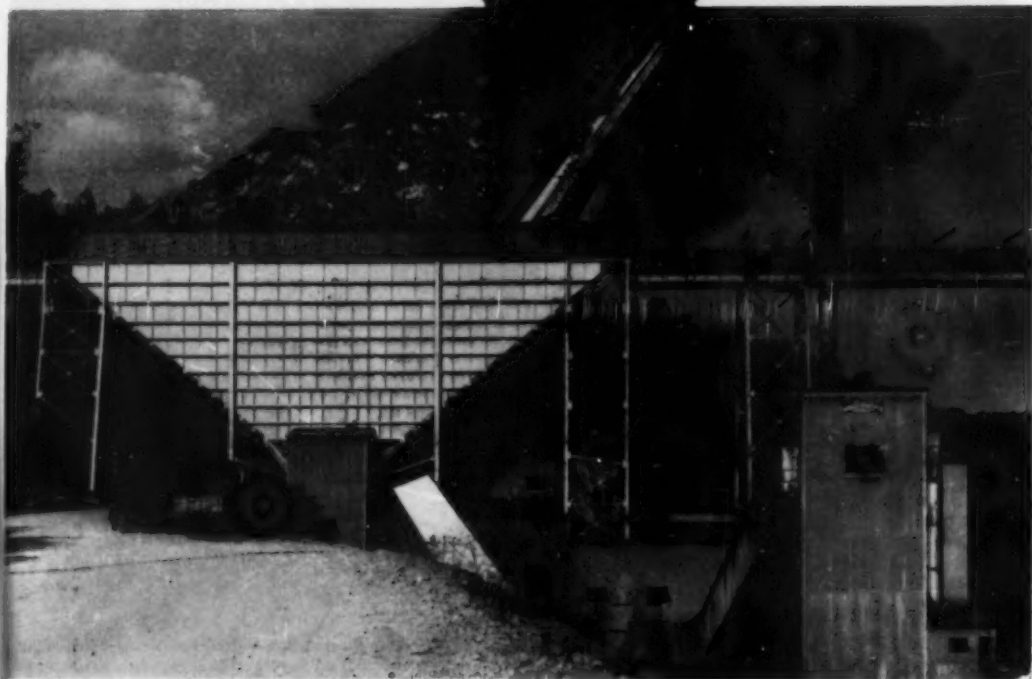
Name

Company

Title

Address

The Road to Profitable, Continuous Mining Leads Straight Through An Adequate Surge Bin



One who has not observed automatic coal haulage cannot visualize the continuity and smoothness of the operation. The cars are loaded and hauled by locomotives in the usual manner. As the trip of cars approaches the head house, they pass over an automatic scale where the coal is weighed in motion. The trip moves on to large surge bin (see photo at right) where the cars automatically lay down their load of coal without breakage and without hesitation.



SANFORD-DAY IRON WORKS

S-D "Automatic" Cars and an Adequate Surge Bin Are Indispensable to Low Cost Mining Today.

This Combination Has As Much To Do With Cutting Your Mining and Preparation Costs As It Does In Reducing Your Haulage Costs!

A continuous supply of coal from the face to the preparation plant is absolutely necessary to produce coal at the lowest possible cost. The only dependable way this can be accomplished is through the use of an adequate surge bin which will serve as a temporary storage for coal in transit. The only practical method of filling a surge bin is with Automatic Bottom Dumping Cars. This Surge Bin used with S-D "Automatic" Cars permits your mining operations and preparation plant to function independently of each other. For each to operate at the lowest possible cost, they must be carried on independently:

1. Any cleaning plant works best, and at the least cost, with an even continuous supply of coal. The Surge Bin continues to supply coal to the preparation plant when, for any cause, there is a delay at the face.
2. With an adequate surge bin, one shift operation of cleaning plant is often sufficient to take care of two shift operation of mine. Breakdowns or delays at the preparation plant need not stop mine production because the surge bin will take the coal until repairs are made.

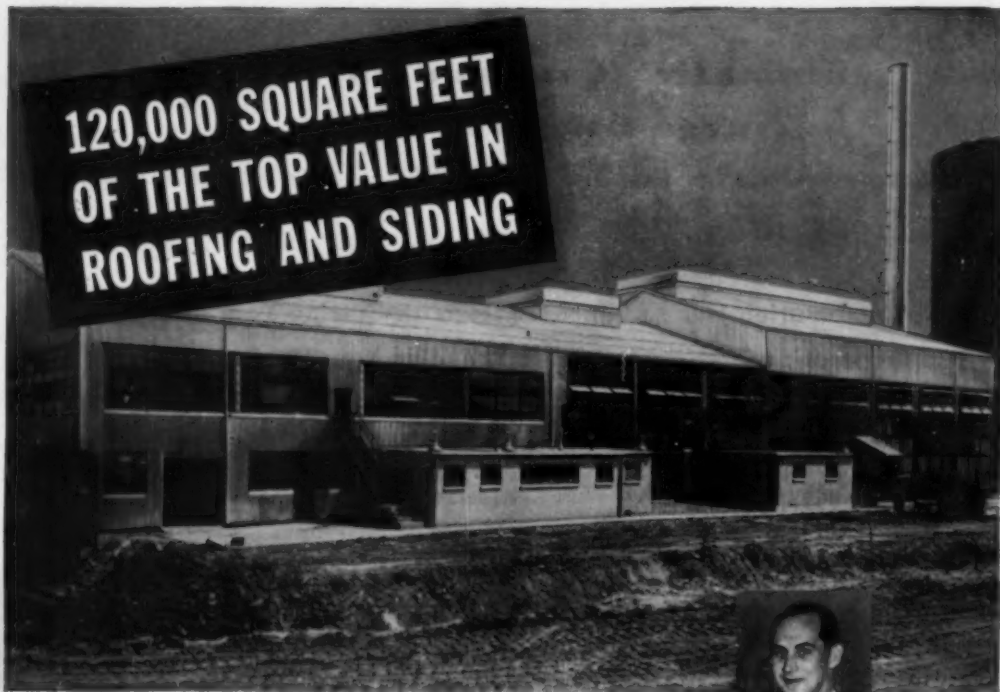
S-D "Automatics" haul your coal, non-stop, as it is mined until the surge bin has been completely filled (see photo at right) and the coal has been automatically leveled with the track from end to end. After dumping, the car doors are automatically closed and the trip runs smoothly back into the mine for re-loading. Slate cars are dumped selectively at wells or slate bins enroute. The whole smooth, continuous operation is accomplished without stopping, with the same locomotive coupled to the same cars and with no delay.

The most economical means of filling a bin is with S-D "Automatic" Bottom Dumping Cars. Usually about 40% fewer S-D "Automatic" Cars are needed because of constant, on-the-move dumping. This lowers the initial installation cost and, of course, maintenance cost. S-D "Automatics" are sealed against dust leakage, reducing track clean-up costs to the minimum. S-D "Automatics" eliminate all manual dumping. This one item is enabling many operators to save thousands of dollars every year! For example, one operator who installed 16 S-D "Automatics" reported he was saving \$20,000 annually by eliminated manual dumping. Another operator, who installed 250 S-D "Automatics" reported he was saving \$100,000.00 annually. Those are cold black figures that in some mines mean the difference between profit and loss! The flexibility of S-D "Automatics" offers additional advantages such as: cars are not limited in size . . . top extensions may be added . . . cars with overlapping ends may be used. Investigate the S-D "Automatic" System now! It may pay you in thousands of dollars annually. Write us today!



Knoxville 1, Tennessee

**120,000 SQUARE FEET
OF THE TOP VALUE IN
ROOFING AND SIDING**

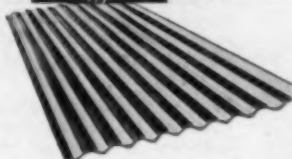


Applicator:
M. W. Nabakowski,
vice-president of the
A. Nabakowski Co.

The Thatcher Glass Company plant at Lawrenceburg, Indiana, called for 120,000 sq. ft. of roofing and siding. The owners and their architects, Herman and Associates, Cincinnati, liked the idea of aluminum. They knew its lighter weight (56 lbs. per square) would save on framing. They knew this rustproof, corrosion-resistant metal would need no painting—practically eliminate maintenance. And aluminum's heat reflectivity would make the buildings cooler in summer, warmer in winter.

M. W. Nabakowski, Amherst, Ohio, roofing and siding applicator, has this to say: "Reynolds Industrial Corrugated is an ideal material because the finished job has eye-appeal, workmen like to handle it, and application costs are easily controlled." But the best testimonial will be written through the years, in superior performance and maintenance economy. It's the top value you want in your next construction. Call on Reynolds for literature, technical assistance and application details.

Offices in principal cities. Check your classified phone book for our listing under "Building Materials," or write: Reynolds Metals Company, Building Products Division, 2003 South Ninth Street, Louisville 1, Ky.



**Specifications for Reynolds Lifetime
Aluminum Industrial Corrugated:**
Thickness .032"
Corrugations 7/8" deep, 2-2/3" crown to crown
Uniform load support (roof) 80 p.s.f. on 4' purlin spacing
Uniform wind load capacity (siding) 20 p.s.f. on girt spacings up to 7' 9"
Roofing width 35", coverage 32"
Siding width 33-3/4", coverage 32"
Lengths 5', 6', 7', 8', 9', 10', 11', 12'



Aluminum is required for planes and other military needs. Reynolds Lifetime Aluminum Industrial Corrugated is still produced, but the total supply is necessarily reduced. Rated orders receive priority handling.

**REYNOLDS *Lifetime* ALUMINUM
INDUSTRIAL CORRUGATED**

Let's go...let's get that SCRAP in!

All your SCRAP is urgently needed, NOW

THE scrap shortage is serious. Your scrap—every pound of iron and steel scrap you can locate in your plant or factory—is vitally needed and needed right away. For unless you do everything possible to get this scrap on its way to the mills, steel production is bound to slow up. That can't be allowed to happen. But without your help it surely will.

It takes at least one-half ton of scrap to make one ton of steel. With the mills turning out more than 2 million tons of steel per week, over 1400 carloads of industrial scrap are needed every day. And industry, somehow, must provide it.

What you can do to meet this emergency

First, organize a permanent Scrap Salvage Committee and make the "drive-for-scrap" part of your daily operations. Search out every possible source of scrap. Turn your old and worn-out equipment, tools and machinery over to your scrap dealer, at once. Dig out your discarded dies, rusted-out tanks and boilers, your old rails and other miscellaneous junk, and start them back to the mills through your scrap dealer. Encourage every employee to report every retired or obsolete machine that now stands idle—see that it is turned in for scrap.

By getting this "dormant" scrap off your premises and into the furnaces you'll be helping not only yourself but America as well. More scrap turned in, means more steel turned out—it's as simple as that. So let's get going.

To the mills, James—



You'll find your local scrap dealers listed in the yellow pages of the phone directory.



1-122

This page would ordinarily be used to tell you about

AMERICAN ELECTRICAL WIRE AND CABLES

but, because without SCRAP we cannot produce steel, we are asking instead for your all-out help in getting more SCRAP to the mills.

AMERICAN STEEL & WIRE COMPANY, GENERAL OFFICES: CLEVELAND, OHIO
COLUMBIA STEEL COMPANY, SAN FRANCISCO, PACIFIC COAST DISTRIBUTORS
TENNESSEE COAL, IRON & RAILROAD COMPANY, FAIRFIELD, ALA., SOUTHERN DISTRIBUTORS
UNITED STATES STEEL EXPORT COMPANY, NEW YORK

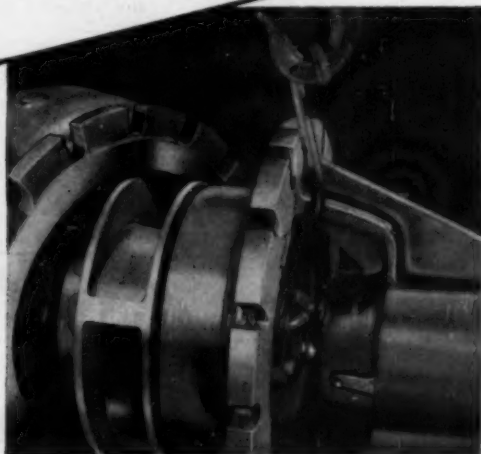
UNITED STATES STEEL

FAST, EASY SERVICING AND LONG LIFE MEAN Low Pumping Costs

Pump is Back in Service
in Less than Half an Hour



1. Remove Casing Bolts, lift and disconnect drive. Just loosen bolts and bolt assembly from slot. Bolt, nut and washers are still connected for easy reassembly.



2. Swing Out Rotating Element. Neither suction nor discharge piping need be disturbed. All wearing parts are fully accessible for inspection or servicing.

ALLIS-CHALMERS Coal Washing Pump



Only 5 Wearing Parts

Shaft sleeve, impeller, casing, two wear plates. All easy to handle and easy to replace.

YOU CAN SEE for yourself how quick and easy it is to service an Allis-Chalmers Coal Washing Pump. Quick and easy service like this, plus long runs between servicing are the two things operators want most.

You get long life, too, because Allis-Chalmers Coal Washing Pumps are made of special *Allisite* alloy . . . because they have thick sections and heavy parts throughout . . . and because they are application engineered by specialists who know coal washing problems and how to solve them.

Three sets of bearings, brackets and shafts cover all pump sizes making spare parts inventory low regardless of the number of pumps you operate. Allis-Chalmers can supply the complete pumping unit — pump, motor, drive and control — from one reliable source with one guarantee of satisfaction.

Get complete information on Allis-Chalmers Coal Washing Pumps from your nearest A-C District Office. Or write for Bulletin 08B6381, Allis-Chalmers, Milwaukee 1, Wisconsin.

A-3478

ALLIS-CHALMERS



Allisite is an Allis-Chalmers trademark.

Prove for yourself why Gates Vulco Ropes are giving you longer V-Belt Wear!

There is a very simple reason why Gates Vulco Ropes—the V-belts built with concave sides—are giving you substantially longer wear—and you can easily prove this for yourself in just 2 minutes' time!

Pick up any V-belt whatever and bend it as it bends when going around a pulley. As the V-belt bends, grip its sides with your fingers—and here is what will happen, every time.

If the belt you are bending is a straight-sided V-belt, you can feel its sides bulge out as the belt bends. This out-bulge forces the sides of the belt to press unevenly against the V-pulley—as shown in figure 1-A (see accompanying diagrams).

Clearly, this uneven pressure against the V-pulley causes the belt to wear unevenly—with the wear concentrated where the bulge is greatest—and this concentrated wear at one point naturally shortens the life of a straight-sided V-belt.

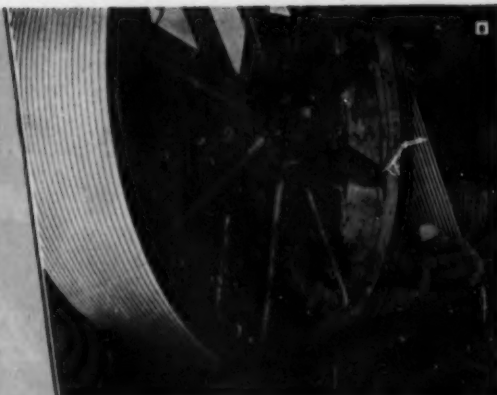
Now, make this same test with the belt that is built with Concave Sides—the Gates Vulco Rope!

Whereas you felt an out-bulge when you bent a belt with straight sides, you find that the Concave Sides merely fill out and become perfectly straight. The sides therefore press evenly against the V-Pulley. This distributes the wear uniformly across the full width of the belt. Naturally, this means longer belt life and lower belt costs for you!

Only V-Belts made by Gates are built with concave sides. Whenever you buy V-Belts, be sure that you get the V-Belt with the Concave Sides—The Gates Vulco Rope!



VULCO ROPE DRIVES
ENGINEERING OFFICES AND JOBBERS STOCKS
IN ALL INDUSTRIAL CENTERS

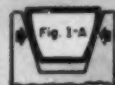


Gates Vulco Ropes very competently handle the drive on this Immense Jaw Crusher, said to be the largest ever built. It supplies most of the coarse rock for rip rap—and for secondary crushing—on the Detroit Dam project, Detroit, Oregon.



What Happens When a V-Belt Bends

Straight-Sided V-Belt



How Straight-Sided V-Belt Bulges in Sheave Groove. Sides Press Unevenly Against V-Pulley Causing Extra Wear At Points Shown by Arrows.

Gates Vulco Rope with Concave Sides



The Concave Sides Fill out to a Proper Fit in the Sheave Groove. No Side Bulge! Sides Press Evenly Against the V-Pulley—Uniform Wear—Longer Life!

CS-9110

THE GATES RUBBER COMPANY • DENVER • U.S.A.

World's Largest Maker of V-Belts



One of These
MUSCLE MEN...

AIRDOX

—the non-shattering force of compressed air

CARDOX

—the powerful expansion of released Carbon Dioxide

Will Show You How
To Get **MORE COAL**
Out of Your Mine



● The Cardox-Hardsoc Auger-Miner will salvage countless tons of coal where stripping was halted because over-burden became too costly to remove. Augers 20 to 40 inches in diameter draw the coal in a continuous flow from the seam. See in the picture how addition of a portable conveyor makes this a continuous operation, loading into trucks or cars automatically.

IN the long run how much coal can be gotten out of a mine per year or per man or per dollar depends on the mining method used.

Both Airdox and Cardox are non-explosive. They heave coal out from the face without shattering impact. Because of the gentle action, roof structure is preserved and that means lower timbering costs, better working conditions and eventually more complete coal removal. Coal at the working face is in condition to be handled more efficiently. Add to this the increased sales realization on delivery and safety improved to a degree which permits on-shift shooting in many mines. It all adds up. You can see how a mine will yield more money as well as coal.

Either Airdox or Cardox will accomplish these results in its own way — and which will serve your mine best is a choice best arrived at between our engineers and yours. But unless you bring them together you'll never know how much your operation will gain from these advantages. Contact us to say you'd at least like to talk about it.

CARDOX-HARDSOCC

Cutterheads

Cardox-Hardsocg Cutterheads are available with replacement bits ranging from 2½ inches to 3 inches in diameter.

Other Cardox-Hardsocg Drilling Equipment

Augers—in a range of sizes
Bits—Wedges
Threadbars—Sockets
Boxing and Boxing Liners

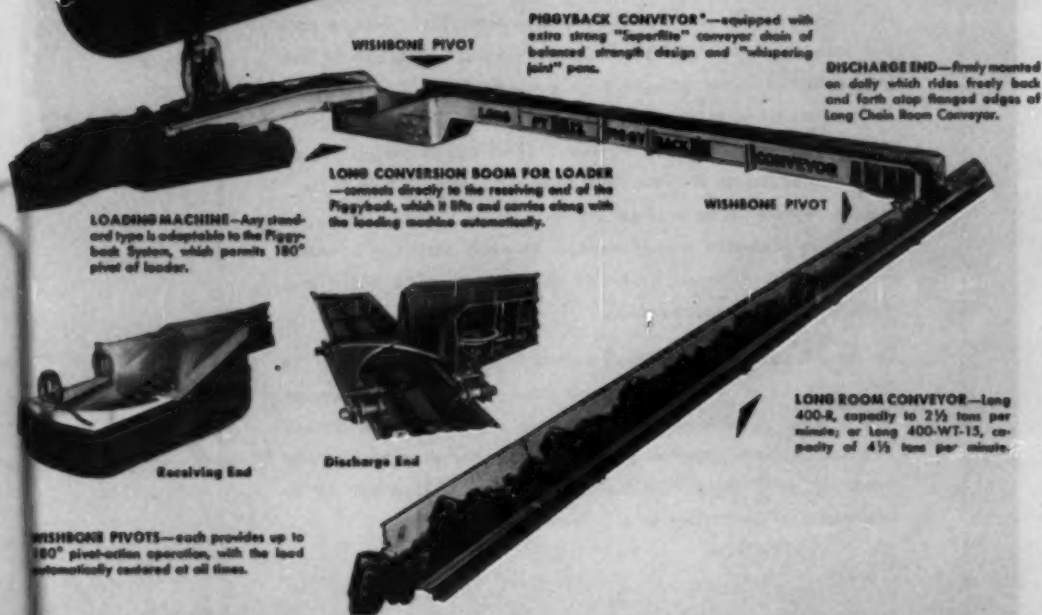


CARDOX CORPORATION

BELL BUILDING • CHICAGO 1, ILLINOIS

LONG PIGGYBACK CONTINUOUS HAULAGE MINING

INCREASES ...with



LOADING MACHINE—Any standard type is adaptable to the Piggyback System, which permits 180° pivot of loader.

LONG CONVERSION BOOM FOR LOADER—connects directly to the receiving end of the Piggyback, which it lifts and carries along with the loading machine automatically.

PIGGYBACK CONVEYOR—equipped with extra strong "Superlite" conveyor chain of balanced strength design and "whispering joint" pins.

DISCHARGE END—firmly mounted on dolly which rides freely back and forth atop flanged edges of long Chain Room Conveyor.

WISHBONE PIVOT

LONG ROOM CONVEYOR—long 400-R, capacity to 2½ tons per minute; or long 400-WT-13, capacity of 4½ tons per minute.

WISHBONE PIVOTS—each provides up to 180° pivot-action operation, with the load automatically centered at all times.

All standard type loading machines and continuous miners are adaptable to the Piggyback System

**Patented and patents pending*

LET'S LOOK AT THE RECORD!

"6 hours and 56 minutes actual loading machine operation time in an 8-hour shift time study."

Superintendent

"40 tons per man-shift in 34" coal with Piggyback-860 loader combination."

Assistant to President

"Addition of Piggybacks to existing loaders and conveyors increased production 300 tons per day."

General Manager

"Loading time peaks of 85% have been hit. Peak production per man shift has been 53 tons."

Vice President in Charge of Operations

"The result (of Piggyback installation) was an immediate increase from 10 to 20 tons per man day."

Editorial Comment

"The Piggyback conveyor impresses my firm as being the forerunner of a new method of mining."

Prominent Consulting Engineer

Under any mechanical loading conditions, you're assured increased efficiency with

PRODUCTION any loader!

- The portable Piggyback—the first and only bridge conveyor—offers a practical, economical solution to the problem of true continuous mining . . . provides the vital link that completes the continuous haulage system from loader to tippie . . . eliminates costly "downtime" waiting for intermediate transportation.

Actual performance under a wide range of operating conditions has already proved the Piggyback* Continuous Haulage System to be the most efficient ever developed for moving coal from the face to the entry.

Operating as the connecting link between the mobile loader and Room Conveyor, the Piggyback takes coal out in a continuous, steady stream *as fast as it is produced*. There's no waiting for intermittent transportation. The receiving end of the Piggyback Conveyor is attached directly to the loading machine and follows it automatically as it moves.

In use, the loader-Piggyback-Long Room Conveyor combination operates as a single machine without any attention whatsoever from the operator. Consequently, he can devote his entire time and energy to operation of the loader. He never has to even look back at the rear conveyor discharge. Further, he never has to tram coal on the loader or stop for pan-ups.

Of particular note is the flexibility and extreme maneuverability of the Piggyback. The two "Wishbone" pivots—one at each end of the Piggyback—provide a pivot action of 180° each. This means the load is centered at all times and continuous haulage can be maintained at a 90° angle breakthrough and in close quarters. The dolly action permits long advances without pan-ups.

Available in two models with rated capacities from 2 to 5 tons per minute, the Piggyback System can be used with any standard loading machine. Write today for complete details!

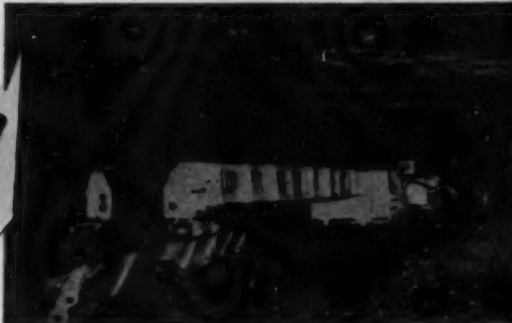
Ask for a demonstration—no obligation!

LONG Super Mine Car Co., Inc.
FAYETTEVILLE, W. VA. • OAK HILL, W. VA.

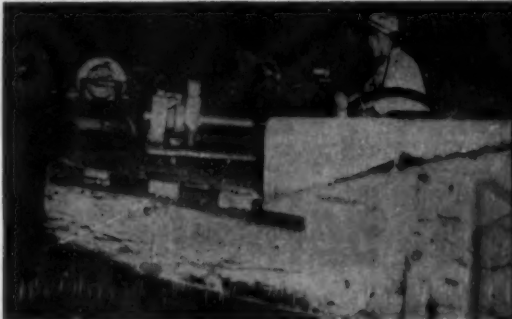
LONG

PIGGYBACK.

CONTINUOUS HAULAGE MINING



Piggyback with 8 BU loader, operating in 36" coal. Loader was readily converted to 32 1/4" height.



Piggyback at sharp angle to 12 BU loading out breakthrough. Note operator is devoting full attention to loading.



Coal discharging from Piggyback in 30" height, 860 loader and 12 BU used in this operation.



Piggyback working behind 14 BU loader in full seam mining, moving out rock with the coal.

6 BIG FEATURES



of Bethlehem Prefabricated Track

Each will save you time...or money...or both

1. The Bethlehem layout you buy is designed for your individual mine . . . by Bethlehem engineers.
You save engineering costs.
2. All rails come to you pre-cut and pre-curved to proper radii. No scrap. Everything ready to install.
You save all cutting and curving time.
3. The track is easy to lay. Rails are numbered; keyed to blueprints of the system. Even untrained crews can quickly install Bethlehem prefabricated track.
You save installation time; much of the cost ordinarily incurred in training crews.
4. All parts are specially designed for the jobs they have to do; each works in harmony with other parts of the system.

There are no "makeshifts." Track is therefore more efficient.

You save expense of elaborate maintenance and overhaul.

5. Bethlehem prefabricated track is better, safer track; you can run trips at higher speeds.
You save transportation time; avoid derailment snafus.
6. The track can be taken up and relaid faster and more efficiently.
You save relaying time.

★ ★ ★

For full information, call or write the nearest Bethlehem office. We'll be glad to furnish details on any or all of the points listed above.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. Export Distributor: Bethlehem Steel Export Corporation



NOW You Can *See* Where You Can't *Look*

DIAMOND "UTILISCOPE"

(WIRED TELEVISION)

Saves Manpower

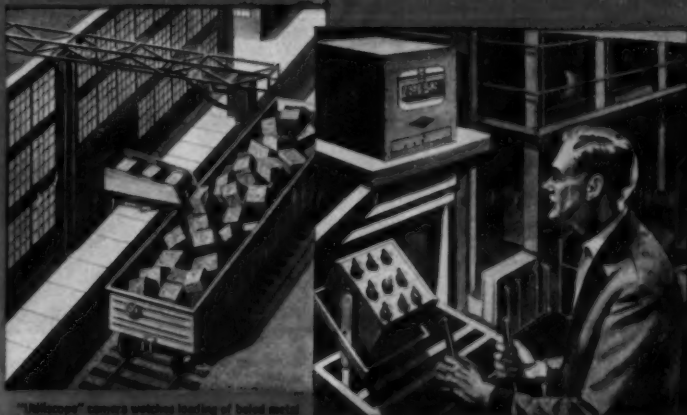
Can You Use the "Utiliscope"?

The advertisement at the right appeared in BUSINESS WEEK. It has been suggested that this ad contains considerable food for thought for the readers of COAL AGE also. The particular application illustrated here may not interest you but it probably will suggest other uses for the "Utiliscope" in your operations.

If you want to look into the possibilities of the "Utiliscope", simply write us for a copy of Bulletin 10251 which explains the equipment and shows various applications. Please address your request to Department "I".

Diamond Power Specialty Corporation

Department "I"
Lancaster, Ohio



"Utiliscope" camera watches loading of heated metal scrap into gondola from crane. Man formerly needed here to move car as required for efficient loading.

"Utiliscope" receiver at labor control station shows operator how car is being loaded. He moves gondola by operating car pulley from his station.

Here is another operation where the Diamond "Utiliscope" (wired television) saves manpower . . . enables one man to do the work formerly done by two.

The "Utiliscope" extends the power of the eye so you can SEE where you can't LOOK. Obstacles that prevent direct observation (such as danger, building members, discomfort, distance, etc.) are easily overcome by the "Utiliscope."

The "Utiliscope" is surprisingly simple and low in cost. No special skill is needed for installation and operation. Stability and reliability are exceptional . . . the "Utiliscope" is readily adaptable to outdoor mounting.

Let us tell you about numerous operations where the "Utiliscope" is preventing accidents, saving labor, improving product quality and increasing production . . . ask for Bulletin 1025.

TYPICAL USES — Inspecting distribution tanks of engines — Inspecting line of water level — Checking remote gauge readings — Observing conditions inside furnaces — Viewing nuclear research — Coordinating materials flow on conveyor.

The "Utiliscope" (Registered U. S. Patent Office)



DIAMOND POWER SPECIALTY CORP.

FIRST IN INDUSTRIAL TELEVISION

LANCASTER, OHIO • OFFICES IN 39 PRINCIPAL CITIES

Diamond Specialty Limited — Windsor, Ontario

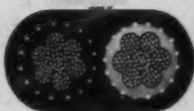
Since 1903, Diamond has Manufactured Quality Equipment For Industry

WRITE FOR
BULLETIN 1025

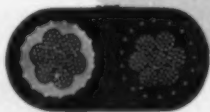
Give Rome 60 the *Rough*



Rugged, well-protected Rome 60 cables stand up—even under tough conditions encountered in low seams, rooms and entries.



Note how the open braid around each conductor firmly interlocks conductors to the sheath . . . prevents twisting, loosening and pulling.



The grounding conductor is solidly embedded in a Neoprene "web" giving exceptional protection against "shorts" and mechanical injury, yet maintaining flexibility and minimizing conductor distortion and fatigue.

Cable Jobs !

Conductors "geared" to Neoprene sheath—prevents failure from twisting, bending or pulling . . .

As the fall is loaded and moved out, you can't stop to worry about cables being twisted, pulled or crushed. And with Rome 60 Mining Cables you don't need to.

A strong reinforcing braid interlocks . . . actually "gears" individual conductors to the Neoprene sheath, providing 360 degrees of balanced adhesion, preventing failure from twisting, bending or pulling of conductors within the sheath. And this open braid construction permits maintenance of full sheath thickness with no thin spots.

A tough, resilient Neoprene webbing between the power and grounding conductors assures maximum flexibility, great resistance to impact and sure protection against short circuits . . . no fibrous separators to rot, deteriorate or wick moisture.

Corrosion, Abrasion, Flame Resistant

Molded in lead to a tire-like toughness, the Neoprene sheath is highly resistant to acids, alkalis, oils, abrasions, moisture and flame. The specially compounded, heat-resistant rubber insulation is suitable for operation at 75° C., providing for maximum overload protection.

To assure less "down time," higher tonnages and lower production costs, standardize on dependable Rome 60 Mining Cables—designed for long, tough service. P-105 BM molded in the Neoprene sheath is your assurance of compliance with Federal and Pennsylvania Safety Codes.

Copper wire mill products are a controlled material under N.P.A. Controlled Materials Plan . . . USE YOUR CMP ALLOTMENT.



Rome 60 Drill Cord

- Neoprene Sheathed
- Long Service Life

Specially made for rugged mine service, these cords last longer and keep replacement costs at a minimum.

The all-resistant Neoprene sheath assures utmost protection against mechanical abuse. Maximum flexibility results from precise stranding of fine wires. The heat-resistant, specially compounded rubber insulation gives high electrical stability. Longitudinal fillers provide increased protection against crushing and tensional strain.

Manufactured in full conformity to State of Pennsylvania and Bureau of Mines Safety Codes. Rome 60 Drill Cord is marked P-105 BM.



The Rome 60 Line Includes:

- Type SO Portable Cords
- Single Conductor Locomotive Cables
- Concentric Mining Machine Cables
- Twin (Parallel Duplex) Mining Machine Cables—Types W and G
- Multiple Conductor Portable Power Cables—Types W and G
- Shot Firing Cord
- Mine Power Distribution Cable
- Shovel and Dredge Cables

IT COSTS LESS TO BUY THE BEST

ROME CABLE

Corporation

ROME • NEW YORK

and
TORRANCE • CALIFORNIA



Are You Prepared To Clean Up Falls As Fast As You Can Shift Cars?

Here the powerful Whaley "Automat" is cleaning up rock falls in a coal mine in the No. 8 seam in Eastern Ohio. Note the limited headroom. Yet, the "Automat" loads the cars to capacity because the exclusive parallel lift rear conveyor is always automatically parallel to top of car. Consequently it takes full advantage of limited headroom.



Suppose you have a heavy fall on your haulage road today. Are you prepared to clean it up as fast as you can shift cars? You would be with the Whaley "Automat"!

In addition to being a fast and dependable coal loader, the "Automat" has no equal when it comes to standing up under the wear and tear of rock work and loading consistently at full capacity.

For your thin coal mines, where you have to take top or bottom rock in brushing haulage-ways, making grades, etc., you will find the "Automat" to be the fastest, most economical and dependable machine on the market. Many coal companies consider the "Automat" standard equipment for this class of work. Complete information will be furnished on request, including Catalog No. 250. Myers-Whaley Co., Knoxville, Tennessee.



MYERS - WHALEY

"MECHANICAL LOADERS EXCLUSIVELY FOR OVER 40 YEARS"

High-Tonnage Haulage

FROM LOW VEINS

The Low-Vein Triplets Get More Low Coal Per Hour

The 26" over-all height of these Westinghouse Triplets speeds high-tonnage output from low seams . . . reduces unproductive "top pulling". Flat top affords high visibility. Special design features assure maximum operating efficiency . . . more time in service . . . more coal per hour. Thus, operating profits are greatly increased.

Select the Triplet best suited to your needs:

8-TON "IN THE ROOM"

5 mph; cam contactor controller; gearless cable reel; two 33-hp motors.

Height.....	26"	Gauge.....	44"
Width.....	69"	Wheel Base.....	56"
Length.....	16' 8"	Wheel Diameter.....	24"

10-TON "FLATROADER"

7 mph; cam contactor controller; two 60-hp motors; can be operated in tandem. Optional "extras" include air brakes, air control and other "big locomotive" features.

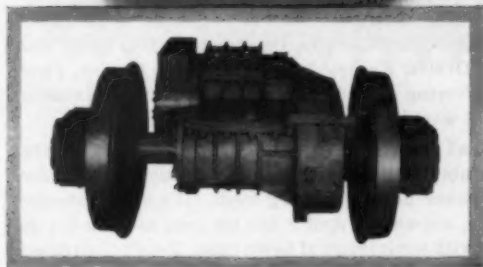
Height.....	26"	Gauge.....	48"
Width.....	73 1/2"	Wheel Base.....	52"
Length.....	16' 3 1/2"	Wheel Diameter.....	25"

15-TON "MAIN HAULAGE"

9 mph; electropneumatic control; two 90-hp motors; can be operated in tandem.

Height.....	26"	Gauge.....	44"
Width.....	78 1/2"	Wheel Base.....	85"
Length.....	21' 2"	Wheel Diameter.....	24"

For further information, call your Westinghouse representative, or write Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania. J-15160



What Makes the Low-Liner Low

Small diameter motors with parallel spur gearing mounted in a common casting—plus smaller wheels—cut over-all height to a new 26" low for haulage locomotives.



YOU CAN BE SURE OF
Westinghouse
MINE LOCOMOTIVES

TOUGH POWER

for tough jobs

Heart of this P. & H. Dragline is a "Cat" Diesel D375 Engine. The rig is owned by Nanticoke Excavating Co., Nanticoke, Pa.



LOOK UNDER
THE HIDE

The advanced design of the "Caterpillar" fuel injection valve offers owners maximum simplicity. Machined to extremely close limits, these valves are made from the finest quality materials — and are subjected to very detailed hardening processes. Valves are completely interchangeable and are adjustment-free. A large single orifice minimizes fouling. With the matched design of valves and precombustion chambers, owners use low-cost, non-premium fuels to get top-notch economy. Look under the hide for quality. It doesn't show on the outside — it shows up in performance.

CATERPILLAR

REG. U. S. PAT. OFF.

DIESEL ENGINES • TRACTORS • MOTOR GRADERS

BARTHOLOMEW EQUIPMENT



When the Nanticoke Excavating Co. had this 3½-yard P. & H. Dragline repowered, a "Cat" Diesel D375 Engine got the nod. Why was it specified? Because of the company's *experience* with seven other "Caterpillar" units — three D8 Tractors, two D311 Engines, a D13000 Electric Set and a D17000 Engine. They were delivering superior performance. It stood to reason the D375 would follow suit. And it has!

Like all "Cat" Diesels, this D375 is tough. It has the lugging ability to crowd bigger bucketfuls. It provides steady power under changing loads. It's a sure starter any time, anywhere. And it has the guts to work day in and out with a minimum of down time. Result: increased production and greater profits for you.

It may pay you to repower *now*. But whether repowering or ordering new equipment, remember that *experience* proves "Cat" Diesels do a superior job in scores of different rigs. Your "Caterpillar" dealer is equipped to analyze your needs and make the installation. He's on the spot for service night and day. Get in touch with him — ask him to *show* you how profitably "Caterpillar" Engines can meet your requirements!

CATERPILLAR TRACTOR CO. • PEORIA, ILLINOIS

SPECIFY UPSON-WALTON BRATTICE CLOTH

**Always dry—
Always flame-proof**

FLAME-PROOFING of Upson-Walton dry-proofed brattice cloth does not depend on moisture, absorbed by chemicals. The chemicals used in treating Upson-Walton cloth flame-proof the cloth directly, and are not designed to absorb moisture for this purpose. Thus you can rely on this flame-proofing—under all conditions.

There are other advantages. Since it does not soak up moisture, Upson-Walton cloth weighs less. Grade for grade, weight is cut as much as 15%. This means easier handling and lower costs.

With a dry-proofed cloth, fungus growths have less chance to start. Thus the cloth gives longer service, and can be re-hung. For added safety and economy, specify Upson-Walton when you need brattice cloth.

Upson-Walton dry-proofed brattice cloth is available in standard and heavy weights.

THE UPSON-WALTON COMPANY CLEVELAND, OHIO

NEW YORK • CHICAGO • PITTSBURGH

Want Facts?

*For a copy of "Brattice Cloth Facts",
which includes samples of cloth,
just send the coupon.*

The Upson-Walton Company
12500 Elmwood, Cleveland, Ohio
Please send copy of "Brattice Cloth Facts".

Your Name _____

Company _____

Address _____

City _____ State _____

WIRE ROPE • ROPE FITTINGS • BRATTICE CLOTH • TACKLE BLOCKS

COAL AGE • November, 1951

65



1. Ready for the shot. Detonation from bottom of eight well-drill holes.



2. Face starts to move out. Toe coming first.



3. Explosive force at work producing maximum fragmentation.



4. The peak of the blast. No wild flying rocks.



5. The broken rock begins to fall.

Proof from the machine gun camera!



ROCKMASTER Blasting Makes the Most of Explosives Energy

Here you see no geysering gases...no wildly flying rock. ROCKMASTER blasting keeps the power of explosives confined where it can do a *real* job on the rock!

These machine gun camera photos—snapped at the rate of three-a-second at the Millington, N.J., operation of the North Jersey Quarry Co.—prove ROCKMASTER milli-second blasting gives control over explosives force, breakage, and throw never before possible.

Ask your Atlas representative to show you the picture presentation of the ROCKMASTER story. See through the eye of the machine gun camera how you can profit by using the correct numbers of the 16 ROCKMASTER milli-second delay detonators teamed with the ROCKMASTER system of explosives choice and loading methods.



6. The well-broken rock spreads out.



7. Here's a rock pile ready for the shovel. Note lack of back break.

ROCKMASTER: Reg. U. S. Pat. Off.

ATLAS

EXPLOSIVES
"Everything for Blasting"



ATLAS POWDER COMPANY, Wilmington, Del. • Offices in principal cities • Cable Address—Atpowco

Locked Tight for LIFE

... no internal slipping
even in toughest
service with

HAZACORD

TWIN PARALLEL TRAILING CABLE



Experience has shown, as you have probably found yourself, that when a twin parallel trailing cable works loose internally — its days are numbered. Hazard's new design prevents this costly trouble — as has been proved out in actual mining service. It's designed especially for shuttle car operation where cable is subject to high-speed reeling.

The tough, long-wearing, flame-resistant Hazaprene ZBF Sheath completely entases each insulated conductor — doubles the holding surface between insulated conductors and sheath, which are firmly bonded and interlocked to form one integral mass. And this extra wall of Hazaprene between conductors also prevents shorting, adds to the cable's flame-resistance. It's an excellent life-saving cushion, too, when cable is run over by equipment.

You'll find this Hazacord cable engineered throughout to give you longer, safer, more economical service than you ever had before from twin parallel trailing cable. The braid over the insulated conductors is made with a tough, reinforcing cord. Grounding conductor is highly flexible, compact and easy to splice. Over-all cable flexibility is ample for your highest-speed-reeling requirements. And the exceptionally abrasion resistant Hazaprene ZBF Sheath provides maximum flame-resistant qualities — more than meets the newest flame-test requirements of U.S. Bureau of Mines and Pennsylvania Department of Mines — "P-104 BM" is molded into sheath at frequent intervals.

For more information or a sample, see your Hazard representative or write Hazard Insulated Wire Works, Division of The Okonite Company, Wilkes-Barre, Pa.

HAZARD

Insulated wires and cables for every mining use



WIRE COUNTERED PRIMACORD



is in the picture when the
going gets *Rough*

Armored to resist highly abrasive conditions, Wire Countered Primacord is recommended for use as down lines in deep, ragged holes. The wire countering increases the tensile strength of the Primacord, and gives it added protection during loading operations.

The four grades of Primacord enable the blaster to meet every condition encountered in coal stripping, open-pit mining, quarrying, pipe-line river crossing, marine work, coyote tunnels, etc. Flexible, easy to hook up and handle, waterproof and insensitive to stray

electrical currents, Primacord is the ideal detonating agent — the modern way to better output, greater economy.

Ask for a copy of the new Primacord Book.

THE ENSIGN-BICKFORD COMPANY
Simsbury, Connecticut

Also Ensign-Bickford Safety Fuse — Since 1836

PRIMACORD-BICKFORD Detonating • Fuse •

Speed

The explosive mass of Primacord travels at a rate of 20,150 feet per second. This is practically instantaneous and allows total time delay between holes and between holes and surface above the hole to be a minimum.

When Primacord is used as a detonating agent, the rate of propagation and its effectiveness are constant as the entire length of the explosive charge is detonated. The number of holes can be set off in one blast.

When the explosive mass is initiated at one end of the hole, the explosive mass is forced by the blast to travel through the hole. The explosive mass is forced to travel through the hole. The explosive mass is forced to travel through the hole. The explosive mass is forced to travel through the hole.

Easy to Handle and Hook Up

Primacord is packed in spools containing 500 feet of 1 1/2 inch cord. Each spool has a hole in the center through which a rod may be run to facilitate unspooling. Since a 1 1/2 inch spool of Primacord weighs 20 lbs., or less, it is practicable to unspool much of the cord with one man of the size, thus saving up loading and hook-up.

Three Types of Primacord

For greatest dependability and effectiveness under various working conditions, Primacord is made in three standard types as follows:

1. **Fig. 1 PLAIN** — for shallow holes and for work, etc.
2. **Fig. 2 COUNTERED** — for use in deep holes where extra strength or resistance to abrasion is required.
3. **Fig. 3 PLAIN REINFORCED** — for extremely deep holes or where maximum tensile strength and resistance to abrasion are required. It has a high tensile strength plastic core, and is not affected by high moisture.

WIRE COUNTERED PRIMACORD

1. **Wire Countered Primacord** is armored with closely braided brass wire. This wire countering has 2 important advantages.
2. The wire increases the tensile strength of the Primacord to 220 pounds.
3. The wire resists abrasion, protects the Primacord during loading operations, or when it is used in ragged holes.

For these reasons, Wire Countered Primacord is recommended for use as down lines when the going gets rough.

WIRE COUNTERING

Let accurately report Area holes at where maximum resistance to abrasion is required.



Primacord Bickford is packed in spools containing 500 feet of 1 1/2 inch cord. Each spool has a hole in the center through which a rod may be run to facilitate unspooling.

Easy to Handle and Hook Up

Wire Countered Primacord is not affected by the factory. Internal three rods are tied together with cord so that in the loading operation the loose end will not be lost down a drill hole. Many spools contain one continuous length, and in no event are there more than three breaks in a 1,000-foot spool, or more than two in a 500-foot spool. Spools containing more than one length are so marked. Lengths are noted from left to right in the order of winding onto the spool the length at the right is "last off." A convenient peroxide in the side of the spool permits instant inspection for determining the correct footage on the spool. Each foot is, of course, roughly three times the diameter of the unspooled portion.

NOVEMBER, 1951

IVAN A. GIVEN, EDITOR

Goal for Tomorrow

WITH THIS ISSUE, *Coal Age* starts on its 41st year of service to the coal-mining industry. The four earlier decades cover a most difficult period in coal's history. Nevertheless, by any scale of measurement, the net of 40 years of effort has been real progress, with the swelling tide of new developments forecasting even greater achievements in the future. The catalyst, as *Coal Age* noted in its first issue, is the broadest possible exchange of ideas. *Coal Age* was founded on that principle, and, with the help of coal men everywhere, it will continue to serve as the industry's foremost medium for the collection, examination and dissemination of ideas designed to solidify coal's position as the Nation's No. 1 source of fuel and energy.

More Needed

INCREASING the depletion rate allowed to coal-mining operations from 5 to 10%—now apparently a certainty even though the new tax bill was yet to be passed at the time of this writing—is a long overdue step in the right direction. While it fails to go as far as simple justice demands and thereby continues to leave competitive fuels with a distinct advantage, it still represents a victory for coal mining. That victory is further evidence that perseverance can get results when backed up by facts.

There remains, however, a real need for additional tax reform for both corporations and individuals. This is evidenced by the fact that taxes—national and local, direct and hidden—now take, according to some authorities, \$2 out of every \$5 of all income, whereas there is general opinion among other than government officials that a rate higher than 25% leads to continued inflation and loss of individual freedom to the state. Another

indication of what is happening is the fact that present federal expenditures are equal to the total incomes of individuals in 20 of the 48 states, with state and local expenditures equalling incomes in an additional seven. In spite of this, the slogan of government everywhere is "More!" The hazards of letting government grow without check, of which the swelling tax take is a reflection, are great and all about us. Coal men, like all other citizens, should make it their business to see that their representatives in government really practice economy and exercise restraint in voting additional government powers.

Possible Asset

METHANE, it might be thought, has no possible value and is only a hazard to be eliminated at a minimum of cost. In fact, in most areas of the United States, that is the situation. Elsewhere in the world, however, a surprisingly different picture exists according to recent reports. In other words, methane is collected, piped out of the mines and sold for cash in Belgium, in the Saar and in the Ruhr.

The first commercial installation for recovering and selling methane is reported to have been made in the Ruhr in 1942. Today, the practice has spread to the extent that, in Belgium, as many as a dozen mines supply pipelines from holes drilled into the overlying strata from the mine openings. Among other things, this reduces the volume of gas that must be diluted and removed from the workings. Naturally, the variety of favorable conditions that must exist to make the venture economical are not found everywhere, particularly in the United States. But this experience abroad might logically lead to further consideration of the idea of bleeding off methane by boreholes—already a successful accomplishment of some years standing in at least one mining region in this country.



TRIED AND TRUE, BUT MORE EXPENSIVE—Railroads move 80% or more of all bituminous mined, but rates have risen about 50% since 1941. Railroads derive more freight revenue from coal than from any other bulk commodity.

With Rail Freight Rates Up Again, Coal Men Seek Cheaper Ways of . . .

Moving Coal to Market

Here's the Cost Picture on . . .

OLD METHODS	{ By Rail	NEW METHODS	{ By Pipeline
	{ By Water		{ By Crosscountry Belt
	{ By Truck		{ As Pipeline Gas

WHAT'S THE CHEAPEST AND BEST WAY TO MOVE ENERGY from source to market? Are there new transportation methods in the making—methods that will benefit coal—for cutting transportation costs and, at the same time, providing fuel customers with energy in the form most useful to them and at a satisfactory price?

At present, the principal methods of transporting energy rank as follows, beginning with the cheapest:

1. Tanker for oil.
2. Pipeline for oil.
3. Ocean collier for coal (cheaper than oil pipeline if over 700 mi).
4. Pipeline for natural gas.
5. Rail for coal.
6. Long-distance high-tension line for electricity.

To hold its own in competition

with other fuels, coal urgently needs cheaper and more efficient transportation. Railroad freight charges, averaging in 1951 close to \$3.25 per ton, actually amount to more than the cost of mine labor figured at 60% of the f o b price of \$4.85 per ton and add up to a big share of the price a customer pays for coal. Transportation thus ranks along with mine-labor costs as an area where increased efficiency and economy will pay biggest dividends—dividends to coal's customers in lower prices and to operators in strengthening coal's competitive position and broadening its markets.

As will appear later, trucking coal to market is not the real answer. Except for short distances, it is too costly. And, though relatively cheap, barges, lake steamers and coastwise colliers are slow.

Naturally, finding an answer to the energy-transportation problem

will not solve all of coal's marketing troubles. If the cost of moving coal to market could be knocked down by half, thus underselling oil or gas, customers who need oil or gas or are willing to pay a premium for them still will buy oil or gas. The question is, can coal deliver energy in the form customers want at a cost that fits into the pattern of fuel buying?

With this question in mind, coal men and others now are seeking new ways of getting coal's energy to the consumer. If their efforts bear fruit, coal may move to market in the future in one or more of the following ways:

1. As a solid, by long-distance overland belt.
2. As a solid, with water as a carrying agent, by pipeline.
3. As a gas, by pipeline.



SLOW, BUT SURE AND CHEAP—Coal moves at low cost by water, but delivery is limited to big customers near unloading points.



FAST AND USEFUL, BUT EXPENSIVE—Counting thermal losses and line losses, long-distance movement of electricity comes high.

4. As a liquid, produced synthetically, by pipeline or tanker.

Whatever the method of transportation and whatever form coal may take, some waste will be inescapable. And waste costs money. If coal is pumped through pipelines, for instance, much of the pumping energy will be used to move water, the carrying agent. If coal is converted into gas or liquid fuel, up to 50% of its original energy may be lost in the conversion process. If it is moved as a solid by belt, the cost of pulling the empty half of the belt back to the loading point must be added in. If coal is converted to electricity, there are thermal losses in the boiler room and line losses on the highline.

But these kinds of waste will not be greatly different in scale from the inefficiencies of conventional transportation—the deadhead return of trucks, railroad cars, barges and colliers. In the new methods of moving coal's energy, the trick will be to hold waste—or, in other words, cost—to a minimum.

For the present and for the future, as far as now can be seen, the following shows how the different transportation methods and costs stack up.

Coal by Rail

RAILROADS DERIVE MORE FREIGHT REVENUE from coal than from any other bulk commodity but their rate structure, up nearly 50% on coal since 1941, is

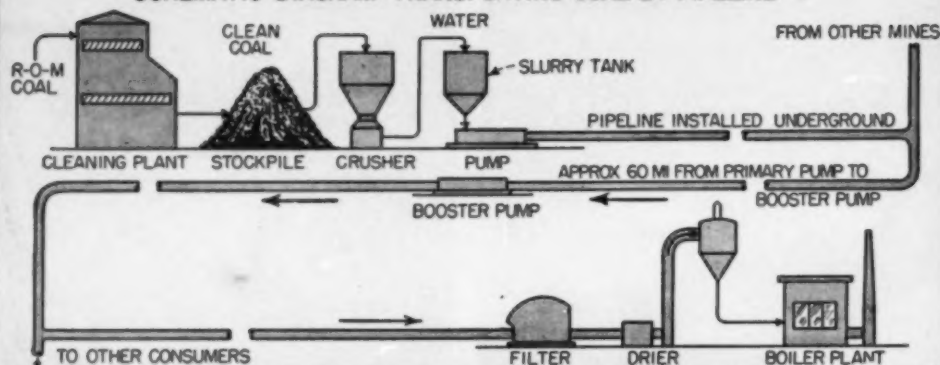
What It Costs to Move Energy to Market			
TESTED TRANSPORT METHODS		Cents per Ton-Mile (Coal Equivalent)	Mills per Million Btu per Mile
Basic Rate			
Oil by ocean tanker.....	14c per barrel for 500 mi	0.11	0.043
Coal by ocean collier.....	\$1.57 to \$2.36 per ton, 700 mi	0.22 to 0.34	0.08 to 0.13
Natural gas by pipeline.....	7.5c per Mcf for 500 mi	0.39	0.15
Oil by pipeline.....	10c per barrel for 100 mi	0.4	0.16
Coal by Lake steamer.....	65 to 75c per ton for 700 to 1,000 mi	0.65 to 1.07	0.25 to 0.42
Coal by river barge.....	93c per ton for 100 mi	0.93	0.36
Coal by rail.....	\$3.09 per ton for 282 mi	1.09	0.43
Electric power			
50% load factor.....	0.37c per kw-hr for 500 mi	1.48	0.57
90% load factor.....	0.21c per kw-hr for 500 mi	0.84	0.33
Coal by truck.....	\$5.60 per ton for 150 mi	3.73	1.55
PROJECTED TRANSPORT METHODS			
Coal by pipeline.....	38c to \$1.91 per ton for 100 mi	0.38 to 1.91	0.15 to 0.75
Synthetic oil by pipeline.....	10c per barrel for 100 mi	0.4	0.16
750-Btu gas by pipeline.....	9c per million Btu for 500 mi	0.47	0.18
Coal by long-distance belt.....	79c to \$1.23 per ton for 85 mi	0.93 to 1.44	0.36 to 0.56

approaching a point of diminishing returns. In 1939, 84% of all bituminous produced in the Nation moved by rail; in 1944 and 1945, about 85%. Since then, the railroads' share of the bituminous movement has dropped to about 80%. Truckers, meanwhile, have increased their haul from a little

over 7% in 1939 to nearly 10% in 1950 and 1951.

The reasons for this shift away from the railroads aren't hard to find. Seeking economies, the railroads have abandoned some short-haul low-traffic lines and some switching terminals. In addition, as the railroads have dieselized, they

SCHEMATIC DIAGRAM: TRANSPORTING COAL BY PIPELINE



CROSSCOUNTRY PIPELINE for coal is now under study in Ohio, where a demonstration-scale pipeline 12 in in diameter and 17,000 ft long is being built. With water the carrying agent, coal can be moved at low cost.

have hauled less coal for their own use. Finally, with shortages of hopper and gondola cars and with a pretty high percentage of bad-order cars, rail service hasn't always measured up to need in the past few years.

On the cost side, rail movement of coal is high. In 1948, the railroads' average haul of coal was 282 mi. It probably hasn't changed much since then. Taking that figure for 1950 and putting it against the average freight charge of \$3.09 per ton in 1950, you find that rail movement of coal averaged 1.09¢ per ton-mile, or 0.43 mills per million Btu per mile. Compare this with 0.1 to 0.16 mills per million Btu for oil through pipelines and 0.25 to 0.42 mills for coal by lake steamer, and rail shipment of coal looks pretty expensive.

Coal by Water—Slow, But Sure and Cheap

COAL MOVED BY INLAND WATERWAY adds up to a little under 5% of total bituminous production.

By water, coal, like most other commodities, moves cheapest of all. But there are drawbacks to water movement. It's slow and, on river routes, mileages are long. Besides, unless the coal is moved by water and rail or by water and truck, water-borne coal can serve only those markets reached by water routes.

Even so, for big customers located in seaboard ports or on the

Great Lakes or navigable rivers, water movement is satisfactory and, on the whole, cheap. Coastwise, by ocean-going collier from Hampton Roads to Boston—about 700 mi—rates in 1951 were raised to \$2.36 per ton for small cargoes, \$1.57 for large cargoes. That figures at 3.4 down to 2.2 mills per ton-mile, or 0.13 down to 0.08 mills per million Btu per mile.

On the Great Lakes, the rate in 1948 was about 75¢ per ton on the short haul to Lake Michigan ports and about 65¢ on the longer haul to Duluth. Figuring around 1,000 mi from Cleveland to Duluth by water route and about 700 mi from Cleveland to Lake Michigan ports, the rate works out at approximately 0.6 mills per ton-mile for the long haul and about 1.1 mills for the short haul, or 0.25 to 0.42 mills per million Btu per mile.

On inland waterways, the 1948 rate from Fairmont, W. Va., to Pittsburgh, a distance of about 100 mi, was 93¢ per ton. This was equal to 9.3 mills per ton-mile, or 0.36 mills per million Btu per mile.

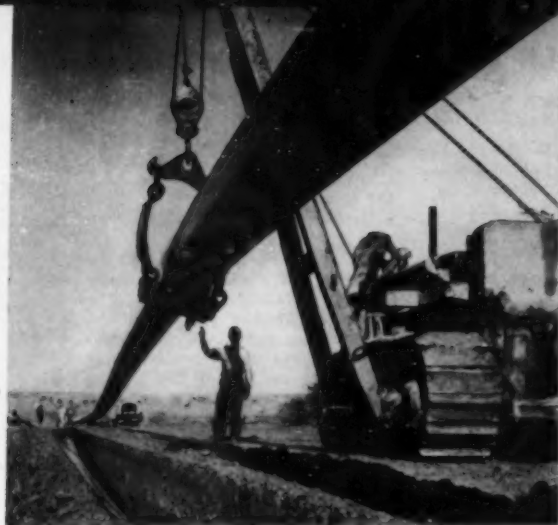
Coal by Truck—Fast, But Law-Ridden

TRUCKS NOW MOVE nearly 10% of total bituminous production. Most truck movements, however, are short-haul operations, mostly from the mine to nearby towns.

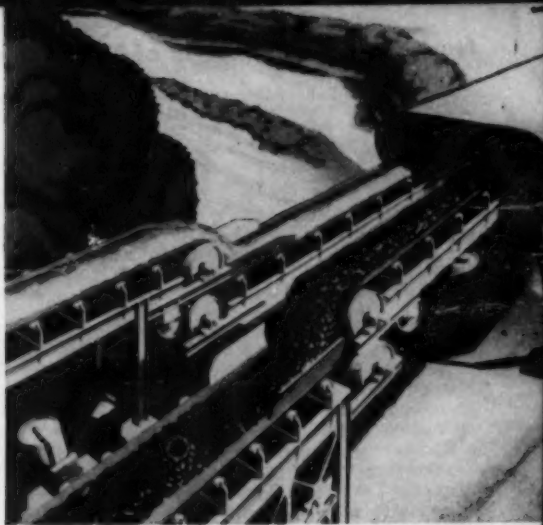
Trucking coal long distances from mine to market is hardly practicable. That's the view of experts of the New York State Truckers Association, Inc., who contend that

coal is one commodity that properly should move by rail. To back up their view, they cite conflicting state regulations on weight, width and length of trucks in interstate commerce; required routings, often circuitous, for inter- and intrastate shipments; costly deadheading back to loading stations, in contrast with railroad practice, in which empty cars are returned in trains carrying partial payloads; high-cost driving labor per revenue-ton; and the magnitude of capital investment in rolling stock, amortization, licensing, insurance and taxes. The fact is, truckers look on their operation as a bonus, high-speed service not very well adapted to moving coal over long distances or in interstate commerce.

Take a look, for instance, at weight regulations in a few coal-producing states, remembering that in interstate movements a trucker must limit his load to the maximum permitted by the strictest state along his route. For example, hauling coal from West Virginia, where the maximum load for a full size truck plus trailer is 36.5 gross tons, to tidewater Virginia, a trucker actually would have to keep his gross weight to 25 tons, the maximum allowable in Virginia. Again, though it might be economical for a West Kentucky trucker to run a loaded truck into Joppla, Ill., where the maximum practicable load for a truck-trailer combination is 36 tons gross, he would be restricted in his own state of Kentucky to 21 tons gross. Likewise, in moving coal by truck from West Virginia to steel mills near Pittsburgh, a trucker



OIL AND HIGH-STU GAS made from coal may move through pipelines someday, but not until manufacturing costs come down.



OVERLAND CONVEYOR BELT has been proposed for moving coal in Ohio. Cost would be considerably lower than by rail.

could start out with a gross weight of 36.5 tons, but he would have to whittle it down to 31 tons gross before crossing into Pennsylvania.

On the cost side, take it this way: At prevailing rail rates, it costs about \$3 per ton to move coal from East Liverpool, Ohio, to Cleveland. To compete, a trucker would have to offer a similar or lower rate. For the 85-mi pay haul, with a net payload of 22 tons (add this to the probable 17-ton tare weight of a truck-trailer combination and you have 39 tons, the allowable limit in Ohio), he would get \$66 revenue, or 3.5¢ per ton-mile. But since he has to deadhead back to East Liverpool, his per-mile revenue is considerably less. At that rate, it's doubtful that he could stay in business. By comparison, a big strip-mine operator in the Midwest recently estimated his pit-to-tipple truck haulage at 1.8¢ per ton-mile—and he uses 50- to 70-ton units in off-highway operations, pays no highway taxes or bridge tolls, buys no license or franchise from the state, suffers no costly traffic delays and grades his haulage roads for easy pulling.

There's a real example of long-distance trucking of coal in the East, where one trucker is licensed by the Interstate Commerce Commission to haul anthracite in 15-ton lots from the Scranton area to Norfolk, Conn., a pay haul of some 150 mi and a round trip of about 300 mi. The tariff is \$5.60 per ton. Revenue for a capacity load thus is \$84—3.75¢ per ton-mile or 1.55 mills per million Btu for the 150-mi pay haul. He deadheads, without rev-

enue, back to Scranton to reload.

Coal trucking, then, adds up approximately to this: For short hauls from tipple to customer, where curbside or small-lot delivery is desirable, where bulk storage is not practicable and where high-speed movement is desirable, truck haulage is feasible because mileage costs don't bulk large. For longer distances, with mileage costs adding up to a significant figure, there are cheaper ways to haul coal than by truck.

Energy by Power Line— Quick, But Costly

MOVING COAL-MADE ELECTRICITY over crosscountry high-tension lines is not a cheap operation when compared with other ways of delivering energy from source to market. Yet the flexibility of electric power—it can be distributed with equal ease in large and small quantities and can be converted easily to useful work in a wide range of applications—offsets much of the high cost of bringing it to market.

According to R. E. Pierce and E. E. George, both of Ebasco Services, Inc., New York City, the incremental cost of moving electricity is higher than that for any other type of energy. Generally, it costs more than moving energy by gas pipeline, which in turn costs two to three times as much as moving energy by oil pipeline. And, unless the load factor is about 50%, electric

power moved by highline can't compete with coal moved by rail except for short distances. Only when the load factor approaches 90% does long-distance transmission of electric power become competitive with coal. At that figure, high-tension transmission lines can move energy as cheaply as railroads can move coal up to several hundred miles.

With data to back up these observations, Messrs. Pierce and George conclude that a low-load-factor steamplant burning coal should be located near the point of electrical consumption and the coal moved to it. On the other hand, a high-load plant very well could be located at the mine mouth, with lines reaching considerable distances to market. Natural gas, they point out, can be transported considerable distances and still be competitive with coal at the plant.

Converting transportation costs of the several fuels into costs per equivalent kilowatt-hour, Messrs. Pierce and George came up with a set of comparative transportation costs, including fixed charges and operating costs, based on 1947 rates and data. Since then, rail rates on coal have moved up some 32% and costs of moving oil and gas in new-built pipelines have risen some 25%, if not more. Higher transmission costs in the electric field, meanwhile, have been fairly well offset by telemetering, automatic load control, high-speed protection and reclosing, lightning protection and excitation. Adjusting the 1947 figures accordingly, we arrive at transportation costs now running about as follows:

New and Untried Ways of Moving Coal to Market Promise Economies

Mills per Kilowatt-Hour
100 Mi 300 Mi 500 Mi

Electricity			
50% load	1.2	2.4	3.7
90% load	0.7	1.4	2.1
Coal by rail	1.1	1.9	2.7
Gas by pipeline ..	0.6	1.0	1.3
Oil by pipeline ..	0.27	0.46	0.65

Manufactured Gas by Pipeline

CAN MANUFACTURED GAS BE MOVED by pipeline and delivered to customers at a price competitive with other fuels?

The answer, at present, is no.

According to studies at Battelle Memorial Institute (*Economics of Fuel Gas From Coal*, edited by J. F. Foster and R. J. Lund, McGraw-Hill Book Co., 1950), fuel gas produced at the mine by the cheapest known method and piped to users in consuming centers can't compete with natural gas piped five to six times as far. To make manufactured gas competitive, the cost of manufactured gas would have to be cut by half or more, or natural-gas prices at the city gate would have to be doubled.

As far as coal interests are concerned, the basic problem is to bring down the cost of manufactured gas. Though the problem is being attacked in several quarters—The Koppers Co., Pittsburgh Consolidation Coal Co., The Anthracite Institute, the U. S. Bureau of Mines and Bituminous Coal Research, Inc., to mention only a few—and though some progress is being made, no one has yet come up with the right answer.

To put manufactured gas on an equal footing with natural gas, a gasification process is needed that will do the following things:

1. Produce gas at high volume, thus lowering capital investment and fixed charges per producing unit.
2. Use low-grade or low-cost coal.
3. Require minimum labor.
4. Make a high-Btu gas, in the area of 750 Btu per 1,000 cubic feet, in a single-stage operation.

The Battelle volume includes some estimates of producing a gas upgraded to 800 Btu by known methods. These estimates do not include plant investment or fixed charges for the upgrading installation, or transportation costs. The latter should add about 7.5 to 15¢ per million Btu for 250 to 500 mi. In a nutshell, these are their estimates

on manufacturing costs per million Btu:

1. Upgrading 285- to 300-Btu water gas to 800-Btu pipeline gas—\$1.19 to \$2.01.

2. Upgrading 280-Btu gas from a Koppers producer—\$1.18.

3. Upgrading 454-Btu gas from the Lurgi process—\$1.22.

In contrast, natural gas can be produced, transported 1,000 mi and delivered in bulk to big customers at a total selling price of 25 to 30¢ per million Btu, or per 1,000 cubic feet. That doesn't look good for manufactured gas.

But the outlook is not altogether grim.

Hydrocarbon Research, Inc., for instance, without revealing details, is studying a single-stage gasifying process that reportedly will cut production costs of 800-Btu gas to 50¢ per million Btu. Elsewhere, at the Institute of Gas Technology, pilot-scale work has produced a 649-Btu gas by low-temperature carbonization. The British are doing research on the possibility of distributing gas made by direct hydrogenation of coal. Likewise, much of the work now being done on the Fischer-Tropsch process is aimed at high-Btu gas rather than at synthetic liquid fuels. Yet the fact remains that there is now no known way to make gas from coal at costs competitive with natural gas.

But as research bears fruit and as the curve of manufactured-gas costs turns downward, it may intersect the rising curve of natural-gas prices, thus speeding the day when the two fuels will be on a competitive footing. At present, with a price of 10¢ per 1,000 cubic feet in the field and with pipelines built in low-cost periods, natural gas can be delivered to city gates 1,000 mi from producing fields at a price of 25 to 30¢. But if current trends continue, field prices of natural gas may well rise to 15, 25 or even 30¢. Likewise, the increasing cost of steel for pipelines and labor for construction, maintenance and operation may well add 10¢ to transmission costs, pushing delivered prices into the 50¢ area. Further, if the gas interests continue to increase their storage facilities, interruptible-service contracts and dump rates may become a thing of the past. That way, manufactured gas may get its foot in the door.

On the question of transmission costs, Messrs. Foster and Lund gathered data and estimates on manufactured and natural gas.

Though their figures are 1946 figures and though transmission costs have risen since then, relative costs as between manufactured and natural gas probably are substantially the same.

Among other things, they argue that in a 24-in line over a 1,500-mi distance at 90% load factor, manufactured gas would have to carry 750 Btu per 1,000 cubic feet and be generated at 450 psi before its transmission costs could equal those of natural gas under the same pipeline conditions. Moving 750-Btu gas 100 mi under these conditions would cost about 1.5¢ per million Btu; natural gas, about the same. Increasing the haul to 500 mi would mean about 9¢ for manufactured gas and about 7.5¢ for natural gas; 1,500 mi, close to 32¢ for manufactured gas and about 23¢ for natural gas. Dropping the load factor down to 70% would push the cost up about 35% on the average.

In the years to come, underground gasification of coal may pay off. At present, however, there is little if anything to indicate that gas produced underground would have the required Btu content or could be economically upgraded to fill the bill as pipeline gas.

The truth is, economical pipeline distribution of high-Btu gas made from coal would be a complex of many problems. Primary problems are low-cost coal and low-cost gas generation. Success with primary problems would whittle down coal's stockpile of puzzles but a good many small problems, some of them newly-created, still would be around to plague the industry. Among the new problems would be: capital for investment in plants and pipelines; complex gasification, extraction, purification, upgrading and compression facilities requiring highly skilled labor; shortages of construction materials for pipelines and compressor stations; interstate regulation of rates and operations; and storage facilities to meet peak demands.

These minor problems, though, would be simpler than the big ones. If coal can hurdle its biggest obstacles—low-cost coal production and low-cost gas generation—the race thereafter may be easier.

Coal by Long-Distance Overland Belt

DON'T WRITE OFF THE LONG-DISTANCE CONVEYOR BELT as a dead duck. True, the Ohio legislature has refused eminent-domain

rights for a belt running between East Liverpool and Cleveland. But the fight isn't over yet and backers of the belt, having made painstaking engineering studies before they revealed their proposal, believe that the belt offers alluring economies, especially among those coal customers who need fuel in large quantities the year around—steel mills and electric power plants, for instance.

Belt backers, led by H. S. Stewart, Jr., president, Akron, Canton & Youngstown R. R., propose to spend over \$210,000,000 for a 103-mi main belt, plus coal-cleaning facilities and two spur belts, to haul coal, limestone and ore primarily to steel mills. Other big coal customers also would be served.

Building the belt line would require 151,000 tons of steel, 267 mi of rubber belting and 353,000 idlers, to mention only a few of the materials needed. At full load, the system would need 250,000 kw of power and 925,000 kw-hr per 300-day year.

Running 20 hr pe. day, the belt would haul 3,400 tpd of coal plus a like quantity of ore or limestone, at 600 fpm, or 6.8 mph. Coal would move faster than by barge and, counting switching and yard delays, faster than by rail in some instances. Since the belt could climb steeper grades than railroads and would span rivers instead of following them, its course would be very nearly a bee-line—the shortest distance between two points.

Savings would be in the order of \$20,670,000 to \$45,280,000 per year for the steel companies in the area served by the belt, Mr. Stewart contends. The lower figure assumes 15,000,000 tons per year of coal and the same quantity of ore and limestone; the higher figure, 20,000,000 tons of coal and 32,000,000 tons of ore and limestone. With transportation economies of roughly \$1.06 to \$1.50 per ton of coal and 43 to 68¢ per ton of ore, steel producers in the Cleveland area could knock close to \$3 per ton off their costs of making steel.

Engineers estimate the cost of hauling coal by crosscountry belt from East Liverpool to Cleveland, a distance of 85 mi, at 79¢ to \$1.23 per ton. That would be 0.93 to 1.44¢ per ton-mile, or 0.35 to 0.56 mills per million Btu per mile. This compares with a rail rate over the same route of about \$2.85 per ton, 3.35¢ per ton-mile and 1.3 mills per million Btu per mile; and a barge rate of \$2.29 per ton, 2.69¢ per ton-mile and 1.04 mills per million Btu per mile.

Coal by Pipeline

WILL MOVING COAL BY PIPELINE save any money?

Officials of Pittsburgh Consolidation Coal Co. think it will. As a field check on their laboratory experiments, conducted since 1949 at Libary, Pa., the company's Ohio division, Hanna Coal Co., now is building a demonstration-size pipeline for pumping coal slurry at the Georgetown stripping property.

The demonstration-scale pipeline system will be a 12-in line stretching 17,000 ft. It will be equipped with specially designed crushing and slurry-preparation facilities and with pumps specified for the job by company engineers. Operating continuously, it will move several thousand tons of coal daily. Complete instrumentation will provide engineering data for checking laboratory results.

Hanna's project envisions an underground pipeline system in which cleaned coal will be crushed to required size, and pumped cross-country to big industrial users (*Coal Age*, March, 1951). At the delivery end, coal will be filtered from the slurry, dried and fed to boilers. Preliminary studies indicate that booster pumps will be needed at 60-mi intervals. The Ohio legislature already has granted publicity status to the pipeline.

Hanna's studies doubtless will seek firm data on such matters as size and shape of coal particles suitable for pumping, degradation, optimum pipeline size and linear velocity, desired weight of solids per unit volume, erosion of pipes and pumps, line pressure drop and maximum grades. Further in the future, problems of water rights and water storage, right-of-way, emergency drainage of pipeline and re-introduction of jettisoned slurry into the line will have to be solved.

To pay out, a coal pipeline must move coal in sizes that customers can burn. It also must serve big customers whose tonnage needs vary little throughout the year. High load factor doubtless will be one of the secrets of economy.

Firm estimates on the cost of moving coal by pipeline are not yet available from Hanna and Pittsburgh Consolidation. Recently, however, U. S. Bureau of Mines Information Circular 4799 summarized previously published data and estimates from several sources. According to that study, from 25 to 40% of coal by weight, with a high percentage of minus 100-mesh particles, can be pumped

satisfactorily. Citing research by Standard Oil Co. (N.J.), the Bureau estimates that fine-coal slurries containing up to 35% solids by weight can be pumped as easily as water, with about the same viscosity, at 3 to 5 fps, or 2 to 3½ mph linear velocity. Because of present pump designs, 800 ft would be the maximum practicable head. This head could be provided by four single-stage pumps in series at each pumping station.

The Bureau also made estimates on construction and operation of coal pipelines of various diameters (10 to 34 in) carrying coal of various sizes (from 1½x0 to ¾x0) in various quantities (5,000 to 36,000 tpd). Construction costs for a 100-mi pipeline would range from \$9,300,000 (a 14-in line carrying 5,000 tpd of ¾x0 coal) to \$25,700,000 (a 28-in line carrying 36,000 tpd of 1½x0 coal).

Operating costs for the 100-mi distance would range from 38 to 95¢ per ton on the low side to \$1.28 to \$1.91 on the high side. On a ton-mile basis, this would be 3.8 to 9.5 mills on the low side and 1.28 to 1.91¢ on the high side. Correspondingly, the cost of moving 1,000,000 Btu one mile would be a low of 0.15 to 0.37 mills and a high of 0.49 to 0.74 mills.

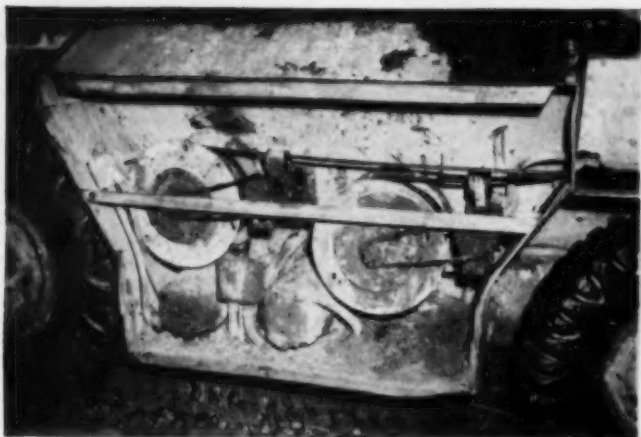
How It Looks For the Years Ahead

THE BULK OF COAL SHIPMENTS doubtless will keep on moving by rail for a good many years to come. That's not because rail shipment is cheap. It isn't, and the chances are it will go up.

The fact remains that the railroads do own enough coal-hauling equipment to move most of the coal produced. No other carrier now can make that claim. And it would take a long time and lots of money to build another transportation network that would equal the railroads.

But the tide may turn slowly. If it does, it will turn because imaginative coal men and their customers, seeking new ways to get energy to market at lowest cost, find their answer in long-distance belts, hydraulic pipelines, conversion of coal to gas or liquid for movement by pipeline, or some other system yet undreamed of. Continued hard work, with minds ever open to a new approach, may bring the answer sooner than might be expected.

Boosting Trackless-Mining Output—With Better Service and Equipment



TWIN REELS on shuttle cars are being tested to reduce cable failures from shorts and simplify the splicing problem.



FACE UNITS are powered through safety circuit centers in the sections.



RUBBER-TIRED service equipment includes universal machines equipped with double sprays for top-cutting and center-shearing, and single-arm drills for putting in shot holes in the working faces.



SHEATHED PERMISSIBLE is used for breaking down the coal. Here is a face wired up for shooting.



ELEVATING CONVEYORS transfer coal from shuttle cars to 5-ton steel mine cars.



TRACKLESS MINING with crawler loaders and rubber-tired auxiliary equipment underlies King mine production planning. Here, a unit is driving a heading and crosscuts taking about 9 ft of coal. The shuttle car is equipped with twin reels.

King Mine Makes Service Pay

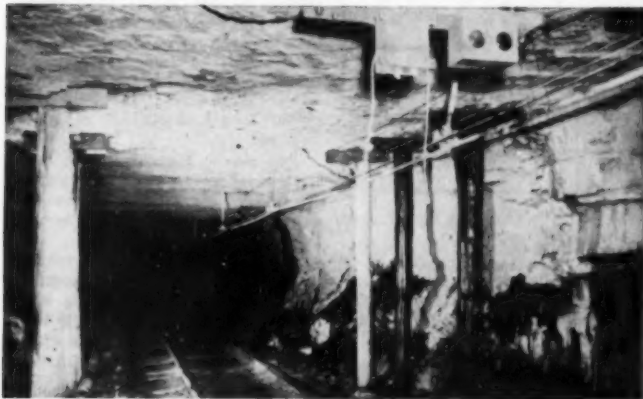
AN INCREASE OF 90 TONS per mining unit in the first month after improvements were completed is proof that tightening service pays. Here's how it was done at King mine of the United States Fuel Co., and how management goes about attaining efficiency at the face in trackless mining.

TRACKLESS MINING in coal 8 to 20 ft thick has recently been supplemented by service improvements—particularly in main-line

haulage—with substantial savings and substantial increases in the output of face mining units at King mine of the United States

Fuel Co., Hiawatha, Utah. In addition to haulage, service improvements also have included an additional portal to facilitate maintenance and the transportation of men and supplies, and to provide up-to-date accommodations for both supervisors and men.

These latest steps at King mine reflect the policy of continuous modernization which has ruled United States Fuel operations for many years, and have, in recent years, been carried out under the direction of S. J. Craighead, vice president and general manager, and G. R. Watkins, assistant to the vice president and general manager. The mine staff is composed of T. C. Jackson, general superintendent; R. W. Ramey, assistant general superintendent; Joseph Parmley, maintenance superintendent; Dean Pettey, preparation-plant superintendent; Shefton Gordon, general mine foreman; B. E. Christensen, Don Snow and Q. Anderson, mine fore-



PRODUCTION-SUPPORT ACTIVITIES at King mine are headed by haulage way modernization, including modern lighting and remotely operated derricks at 2,000-ft intervals.

Efficient Mining Methods and Better Haulage Key Factors at King Mine



NEW TANDEM LOCOMOTIVE handles first stage of main haulage over new haulageway.



RUNAWAY PROTECTION on the main haulageway is provided by remotely operated electrical derails.

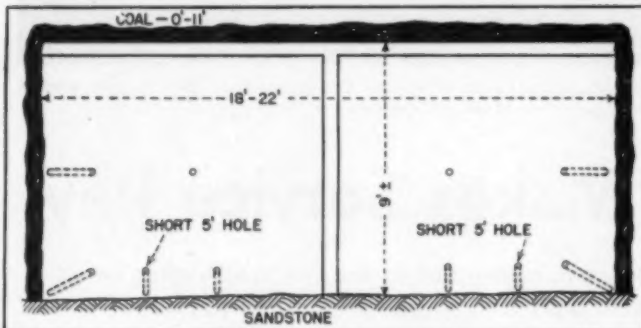


FIG. 1—DRILLING PATTERN in first mining includes eight long and two short holes.

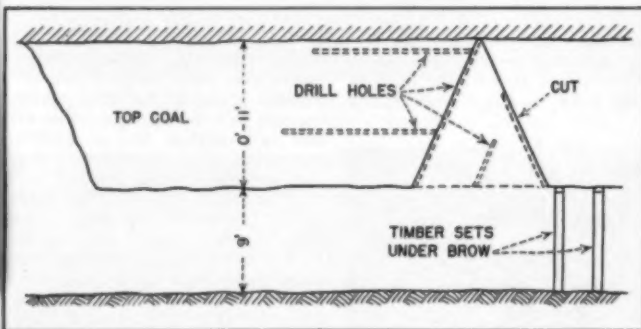


FIG. 2—TOP-COAL RECOVERY starts with cutting and shooting a wedge to the roof, then drilling horizontally to bring down the remaining coal.

men; N. Lee Kirk, mine cashier; J. Paul Storrs, engineer; and D. V. Garber Jr., chief surveyor.

Trackless Mining

Mining at King mine is presently being conducted in the Hiawatha bed. A new area is now in the

process of development. The coal dips approximately 2.8% southwest and lies under 1,800 to 2,000 ft of cover.

Above and beneath the coal seam are massive thick beds of shale and sandstone. The goal in mining is reasonably complete recovery which, however, presents

somewhat of a problem in pillar extraction in the thicker areas of the seam. The system now being used, and which will be detailed later in this article, was evolved after considerable experimentation, and it is believed will provide good recovery with both safety and efficiency.

FOUR UNITS HANDLE OUTPUT

Trackless mining went into effect at King mine in May, 1945. Early in 1948, the mine was equipped and operated on a three-shift basis using 5 or 6 units and producing 5,000 to 6,000 tons per day. At present, on account of slow market conditions, four mining units—now largely in development work—are producing an average of 3,200 tons per two-shift day. Each mining unit comprises the following equipment:

One 11-BU loading machine.

One CD-18 single-arm rubber-tired coal drill, using Coalmaster augers and McLaughlin heads and bits.

One 10-RU rubber-tired cutting machine with 9-ft bar. The mine is now standardizing on Cincinnati cutter bars and chains, and uses heavy-duty Cincinnati Duplex bits.

Two 60-E Super shuttle cars with a capacity of 10 tons each.

One Joy elevating conveyor.

One 15-ton General Electric trolley locomotive.

Crews per mining unit consist of 12 or 14 men, depending upon whether one or two shuttle cars are used. With one car, one timberman is employed as a rule; with two, two timbermen. On this basis the crew set-up is as follows: loader operator and helper, two machinemen, two drillers, one shotfirer, one or two shuttle-car

operators, loader-head man, motorman, one or two timbermen and the section foremen.

DOUBLE REELS INSTALLED ON SHUTTLE CARS

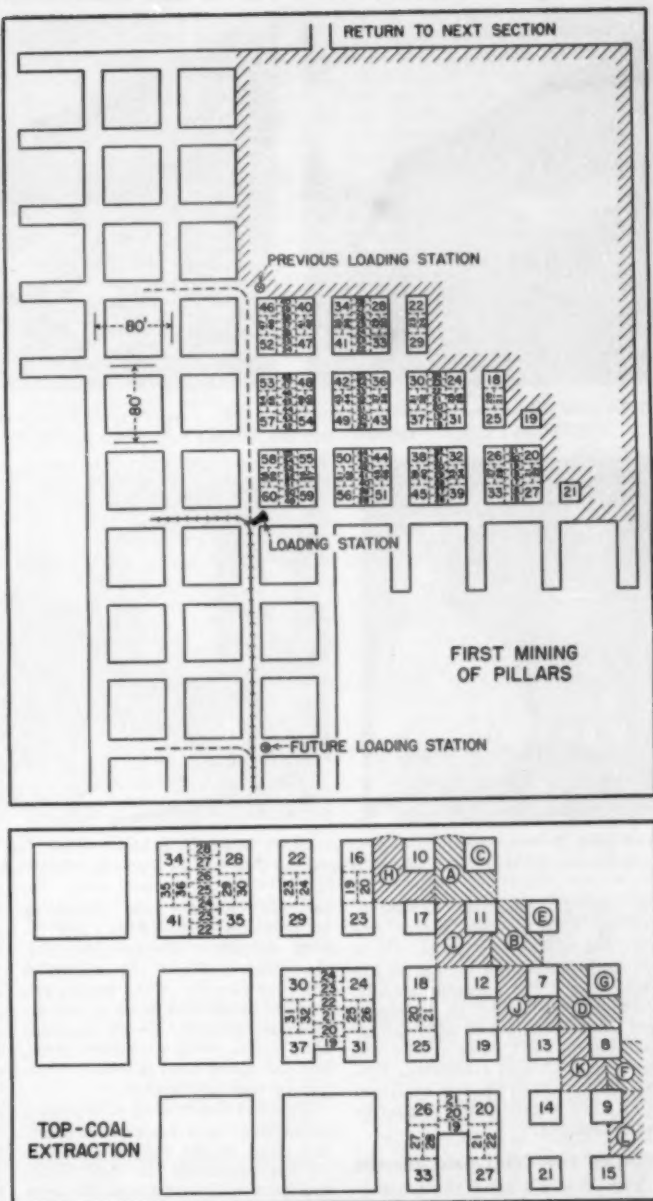
As an experiment two of the shuttle cars at King mine recently have been equipped with twin cable reels, thus permitting the use of separate single-conductor cables for positive and return DC power. The reels are regular-type units cut down to approximately 24 in in diameter. As shown in the accompanying illustration, the two small reels are mounted in the same space as the original larger reel. Each is equipped with its own motor, and the two are arranged tandem-fashion.

Reduction in the number of cable blow-outs and in splice difficulties were the goals in going to twin reels. With the original reels, the cables were twin-parallel No. 4-wire units. These blew out often and otherwise gave a great deal of trouble. Good on-the-job splices were difficult to make. One splicing problem was obtaining equal-length conductors after splicing to achieve equal tension. In addition, water is encountered in practically every working place in the mine. It has a tendency to seep into the splices. The moisture results in decreased resistance between the conductors. Many cable blow-ups were experienced for this reason even when there had been no apparent damage to the jacket or insulation.

DEWATERING AND SPRINKLING

Water, as noted, is present in practically all working places. As a result, almost every working place is equipped with a 1½-hp Gorman-Rupp self-priming centrifugal mine dewatering pump, which moves the water to collecting sumps for further movement by larger pumps to the main pump sumps. Main pipelines are Transite or steel with Victaulic couplings. Water is piped into each working place to serve sprays on the machines and for separate wetting of the face and the broken coal after shooting. On cutting machines, for example, two garden-hose nozzles—one on each side of the rear end of the bar—have been found most satisfactory for dust-allaying purposes.

One trackless-mining unit normally operates in 6 to 7 places, whether in entry or room work, and the first mining operation consists of taking the lower 8½- to



FIGS. 3 AND 4—PILLARS ARE MINED, including recovery of the top-coal, in rigid synchronism. Fig. 3 also shows location of loading stations and placement of tracks.

9-ft bench of the seam. In taking 8½ to 9 ft in first mining, headings are driven 18 ft wide and rooms and crosscuts 20 to 22 ft wide. All places are top-cut and center-sheared, and the coal is shot with 10 holes placed approximately as shown in Fig. 1. The top

two holes on each side of the shear are drilled straight in; the other three are angled to the bottom. One of the latter is a short hole about 5 ft long to break up the "bridge" between the others and clean the bottom.

Shooting is done with 1¼x8-in

King Program Features New Portal and Maintenance Facilities



SOUTH FORK PORTAL includes 40x120-ft change-house (left), along with supply house (right), repair shop, fan and docks and loading facilities for receiving, storing and handling equipment and materials.



KING MINE STAFF includes (left) Virge Olsen, section foreman; B. E. Christensen and Don Snow, shift foremen; T. C. Jackson, general superintendent; Shefton Gordon, general foreman; and Clea Gordon, Charles Majnik, Max Robb and Merrill Bearson, section foremen.

Red H "C" sheathed explosive. Cutting and drilling crews are provided with safety jacks, which are set either at the face or at the point where the operator stands. Standard timbering in headings and rooms consists of posts along each rib on 20-ft centers, with the posts on each side staggered. Following first mining, top coal and pillars are mined on the retreat in room sections.

MINING TOP COAL AND PILLARS

Figs. 3 and 4 show the top-coal and pillar-mining plans now being used at King mine. The first step in pillar-mining is driving across the block, then mining both ways from the center to make an opening in the form of a cross. All pillar operations—splitting and top-coal recovery—are synchronized by "cut" numbering to insure an even break line and orderly extraction.

Although pillar splitting and

top-coal recovery are shown in separate diagrams (Figs 3 and 4), both operations are synchronized. As shown in Fig. 4, the stumps at the four corners of the pillars are mined in step with the top-coal extraction. Usually the stumps are shot unless weight crushes them, and the stump coal is loaded without further preparation.

To start the mining of top coal, a machine cut is made at the starting point in the top on an angle of approximately 60 deg. Holes are then drilled at about the same inclination but in the opposite direction and a wedge of coal is shot out. Drilling and shooting are continued until the top rock is reached. Next, using hand-held pneumatic equipment and working from the top of the loose coal, holes are drilled horizontally, as shown in Fig. 2. These are shot and new holes are again drilled from the top of the loose coal until all the coal in a particular lift

is down. It is then loaded. To hold the top coal in place at the point where the cut is made, two cross-bars on timber legs are set, as indicated.

As the blocks are mined, places are turned from the entry, and from the rooms, into the solid coal on the respective sides, as indicated, in preparation for the next cycle in development. It is important in room-and-pillar work at King mine to keep the openings back of the active working sections to a minimum, and also to keep them as close to the working areas as possible. This is done to facilitate roof control.

15-CAR TRIPS SERVE SECTIONS

As a rule in room work, loading stations are established every third place as shown in Fig. 3. Heavy rail—50 lb or better—is laid into every section, and the track is turned at each loading station as indicated, though a

straight tail track sometimes is employed. Fifteen-car trips are pushed to the loading station by 15-ton GE trolley locomotives, and then are pulled out one by one as loaded. With this system, time lost in changing trips is materially reduced.

This step, plus the reduction in delays caused by waiting on trips from the outside as a result of haulage improvements to be detailed later, was largely responsible for an increase of 90 tons per mining unit per shift in May of this year—the first full month the improvements were in effect.

Service Modernization

Since the seam outcrops high on the mountain above the preparation plant, an incline is required for the final transportation stage at King mine. From the top of the incline inside, trips are handled by locomotives. Modernization of the main-line haulage-way included rebuilding the old portion and construction of a new haulage-way to reach the new mining area now producing the King-mine output. Length of the old haulage-way is approximately 21,000 ft. The old section was relaid with 75-lb rail on 6x8-in by 6½-ft creosoted or copper-sulphate-treated ties. Rail joints were bronze welded.

EXTENDING THE HAULAGEWAY

The extension of the main haulage-way is presently 6,000 ft long on a grade of approximately 2.8% against the loads. The heading was driven 18 to 20 ft wide. Grading was accomplished by shooting down top coal as necessary for clearance and to get the required grade. The subgrade, therefore, consists of an average of 3 to 4 ft of broken top coal. This permits water to drain off through the crosscuts into the side headings, and has eliminated what would have been a difficult drainage problem had the subgrade been cut in the bottom rock.

With one exception, curves on this haulage-way have a radii of 400 ft or more. The track is laid with 65-lb rail, tie plates, gage rods, rail anchors, and 6x8-in by 6½-ft ties. The track is ballasted with gravel. Special attention was given to the problem of lighting. As a result, 50-w, 300-v lamps were installed 24 in outside the right rail (looking inby) on 50-ft centers. Illumination is good and placing the lamps to one side re-

duces glare and promotes visibility for locomotive crews.

To minimize the potential hazards of runaway trips, Cheatham electrically operated derails with Nachod signal boxes were installed every 2,000 ft along the new track section. As the trip enters a derail section, the motor-man, by means of a pull rope, closes the derail. As he leaves the section, he pulls another rope to open it. The signals reflect the operation of the pull ropes to show derail position in either direction.

MOTIVE POWER IMPROVED

Trips are moved over the main haulage-ways in two stages. The standard trip consists of 30 5-ton cars, and the total trailing load is approximately 200 tons. From the portal to the beginning of the new track section—a fairly level stretch—the trips are handled by a new 24-ton 4-wheel 300-hp Jeffrey locomotive.

On the extension of the haulage-way where, as noted, the grade averages 2.8% against the loads, trips are moved by a new tandem unit. It consists of two 24-ton Jeffrey locomotives with rated speeds of 10 mph at rated draw bar pull. Features include electro-pneumatic control; dynamic, air and manual braking; air sanding, twin headlights, standard two-wheel trucks, two 150-hp motors each.

POWER DISTRIBUTION

To provide additional power for mining operations, 5,000-v armored cable has been installed to transmit the 2,300-v power. Two 300-kw three-unit Westinghouse portable rectifiers have also been installed at strategic points to supplement the 300- and 400-kw m-g sets. Among other things, the cost of maintaining conversion equipment has been reduced by these rectifiers. Power for the operation of face units is distributed through Mines Safety Circuit Centers.

PORTAL MOVE HELPS EFFICIENCY

To reduce the cost and time involved in handling men and conducting service operations, a portal was constructed at coal level in the South Fork of Miller Creek Canyon, from which it receives its name of "South Fork Portal." This portal is served by a two-lane highway.

Facilities at the South Fork portal include a modern change-house, powder and cap magazines, repair shop, supply house, venti-

lating fan, central heating plant, and special docks for loading supplies and handling heavy equipment. In supply handling the goals are truck delivery to save freight and handling charges, and loading directly into mine cars where feasible.

The change-house—a 40x120 Butler Alclad Building—includes change and shower facilities for 250 men. Separate facilities are provided for 25 foremen. The building also contains a lamproom with storage and charging capacity for 500 Edison cap lamps, a first-aid room, and separate offices for the engineers and mine foremen. It is equipped with fluorescent lighting.

MAINTENANCE FACILITIES

The repair shop at the South Fork portal is for inspection and repair of mining equipment, including cutters, loaders, locomotives and shuttle cars. It includes a separate section for mine-car repairs. Phillips transporters are provided for moving heavy off-track equipment, and a concrete platform is provided onto which it can be unloaded. Height of the platform is the same as the height of a 21-ton low-bed trailer, which facilitates loading of units destined for overhaul at the main shop some 2½ mi away. The trailer also is used for moving pipe and other heavy materials. As noted, all overhauling and rebuilding is done in the main Hiawatha shop.

The supply house at South Fork is designed to handle current requirements of operating materials. The stock is replenished from the main warehouse at Hiawatha. Powder and cap magazines were constructed in accordance with the federal and state safety codes and the recommendations of the Institute of Makers of Explosives. Shipments are received by truck, and daily supplies are trucked to the portal and loaded directly into special cars.

Supply-handling facilities include a timber yard designed for truck receipt and with docks for easy loading into cars or onto mine trucks. Also included is a loading dock at mine-car height for receiving sand and gravel by truck and dumping it directly into mine equipment.

Rounding out facilities at South Fork is a new 10-ft LaDel fan rated at 200,000 cfm at a water gage of 2½ in. It replaced two older centrifugals and one disk fan.

How Stripping Shovel Made Its Way Across a 10-Mi Obstacle Course



OBSTACLE 1—The shovel climbed out of the old pit by negotiating this 500-ft roadway up a 10% grade. It took a sharp left turn onto a haulage road and from there had clear going for nearly a mile. A steel-armored cable brought power to the shovel from a substation a mile away. Shovel had easy going on a haulage road until it reached Obstacle 2.

Fast 10-Mi Move Made While . . .

Shovel Jumps Seven Hurdles

**Latest Move by Northern Illinois Coal Corp. Proves
You Can Take a Big Shovel Crosscountry Without:**

Stalling Highway Traffic Cutting Off Utility Services
Shutting Down Railroads Making Farmers Mad



OBSTACLE 4—The shovel negotiated a night move between these farm buildings. Clearance for swinging oak mats was minimum. Prior agreements with farmers along route provided for replacement of fences and payment for damaged crops. Corn, soybeans and hay at height of growing season lay along route.



OBSTACLE 5—Illinois State Highway 113 lay across the shovel's path. A bulldozer filled drainage ditches before the shovel passed and opened them afterward. By arrangement with highway officials, traffic was diverted for about 45 min. Armored cable carrying 4,400 v was passed through culvert.



OBSTACLES 2 AND 3—Three-track railroad crossing includes main lines where Santa Fe's crack trains, "The Chief" and "The Super-Chief," pass at high speed. Two rail lengths were taken up to make way for the shovel. Railroad-signal and telegraph lines were buried. Crossing started at 5 pm and was completed some 3 hr later. Because of floods then raging in Kansas and Missouri, rail traffic was slack. Ducking under the "hot" 220,000-v high-tension line in background, shovel passed close to tower and lowered boom to obtain 12-ft clearance. A cable was run from shovel to a driven ground rod.

IT'S NO SIMPLE CHORE to move a big stripping shovel crosscountry. But by careful planning, winning the cooperation of neighbors and coordinating trail-blazing and clean-up crews, you can get the job done with maximum speed for your company and minimum annoyance for your neighbors.

That's how Northern Illinois Coal Corp., Wilmington, Ill., set about moving its big Marion 5560 from the No. 9 pit, recently worked out, to the new No. 11 pit, some 10 mi distant, where three Marion 7800 draglines have been working for about a year. The shovel, now settled down in the new pit, works in

MORE ➔



OBSTACLE 6—Transcontinental radio and telephone cable alongside a county road was run underground temporarily. Prior agreements had been made with telephone company to have workmen on hand at the right time. Note that the fence also is down. Phone cable and fence were re-erected.



Wide World

OBSTACLE 7—Seven hours was budgeted for crossing U.S. Highways 66 and 66A and Alton R. R. tracks. Highway officials forbade closing both highways at the same time. Freight and passenger rail traffic was studied to find time when crossing would be least inconvenient. Small dragline crossed at the same time.

How Methods, Equipment and Men Moved Shovel Efficiently



OPERATION BOOTSTRAP—Shovel swings oak mats ahead to advance roadway. Weighing close to 1,600 tons, the shovel kept moving three shifts and advanced between $\frac{1}{4}$ and $\frac{1}{2}$ mi per day.



SHOVEL MATS, made of 12x12-in by 18-ft oak timbers lashed together with wire rope, spread shovel weight to about 15 lb per square inch of bearing surface. Dozer shoved mats into place.



PORTABLE SUBSTATION made five power taps during the move. Armored cable is $1\frac{1}{2}$ mi long. Here it reaches back to Santa Fe R. R. crossing, more than 1 mi away.



SKID-MOUNTED JUNCTION BOX, made in company shops, provides three taps off the armored cable. This box and others like it were used every 1,000 ft along the big cable.



FENCE CREWS cleared the way ahead of the shovel and replaced fences afterward. Crops at height of growing season lay along route. Farmers were paid under terms agreed upon earlier.



CLEAN-UP EQUIPMENT smoothed down gashes in the land and dragged trash into piles for burning. Here, road patrol hauls diesel fuel to supply itself and the dozers on the job.

tandem with one of the draglines.

Here are the major obstacles encountered in the 10-mi move:

1. A 10% grade on about 500 ft of roadway out of the old pit.
2. A three-track rail crossing involving the Santa Fe and Alton, plus telegraph lines.
3. A 220,000-v power line.
4. A farmhouse, shed and barn.
5. State Highway 113.
6. An American Telephone & Telegraph transcontinental cable.
7. A complex crossing involving the single-track main line of the Alton R. R. lying between U. S. Highways 66 and 66A.
8. Minor obstacles, including: roads, thriving farmlands, two oil pipelines running underground, and drainage ditches, streams and fences.

Superintendent F. W. Uthoff, Mine Electrician J. C. Rettenmayer and Mining Engineer W. A. Weimar, with other officials and attorneys of the company, began planning the move several months in advance. To ensure a move with fewest hitches and delays, they mapped the route; estimated a time schedule; planned power-line taps; arranged with highway officials to divert traffic and with utility companies to bury power and telephone lines; obtained permission from the nearby town of Braidwood to cross streets; worked out a schedule with railroads and Western Union that would cause least interruption; planned with A. T. & T. for temporary burial of the transcontinental cable; agreed with Commonwealth Edison on a place and method for underpassing the "hot" high-tension line; asked oil-company officials to post observers at pipeline crossings; and drew up agreements with farmers whose property would be crossed and whose crops would be damaged.

The move began July 19, when the shovel started out of No. 9 pit, about 3 mi northwest of Braidwood. The move was completed 24 days later, on August 13, when the shovel dug into the new pit 5 mi due south of Braidwood.

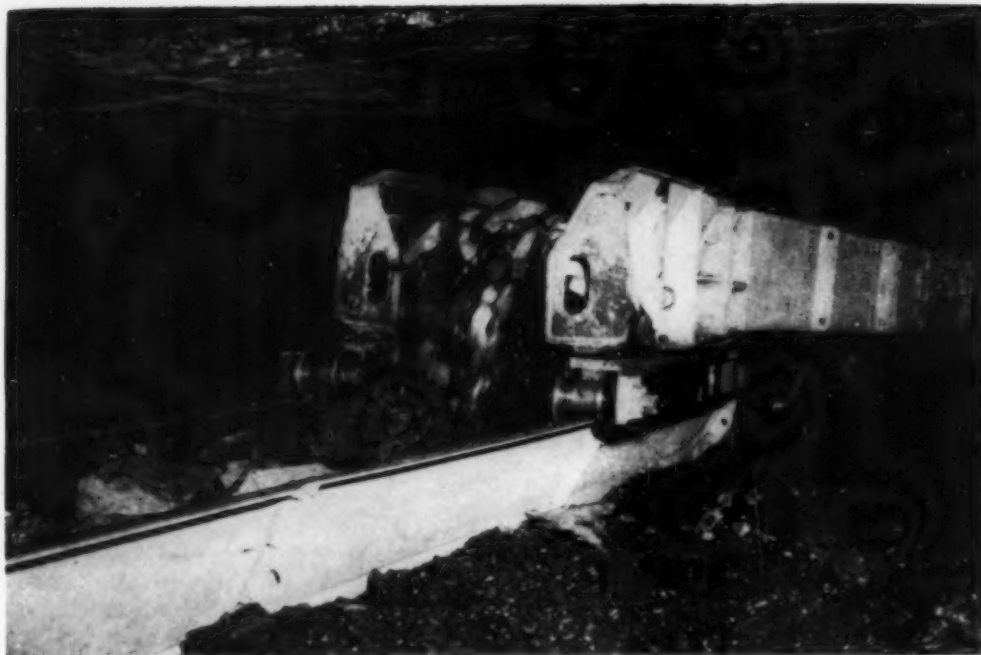
Careful planning and supervision made the move eventful. The accompanying photographs show some of the obstacles and some of the men, equipment and methods that made the move successful.



PIT-TO-PIT MOVE—Here's the route the shovel followed, with obstacles, power taps and day-to-day progress noted.



BIG WHEELS in the shovel's move—Mr. Rettenmayer (left) talks over the problems ahead with O. D. Livingston, pit foreman, who directed on-the-scene movements. Mr. Rettenmayer solved all electrical problems involved in the move.



SHORT CONVEYOR, pouring coal from loader to room conveyor, rides on top of pan line.

Non-Stop Face Haulage

With a Gap-Spanner From Loader to Room Conveyor, Thacker Mine Gains . . .

One-Third More Tons per Loader Wider Rooms, Longer Advances
Ten Tons More per Manshift Faster Loader Trammig



PIVOTING through 180 deg. gap-spanning conveyor with yoke-type fitting spills no coal.



MOTOR END of the conveyor hangs from the loader boom. The boom is especially adapted for this purpose.

ONE-THIRD MORE TONS PER LOADING MACHINE and 10 tons or more per man-shift is the gain chalked up at Thacker mine, Leckie Collieries Co., Aflex, Ky., by adding four span-type conveyors to existing equipment—12BU loaders and chain-flight room conveyors. Leckie officials are betting that performance will move up still more when certain loading-machine service kinks are ironed out.

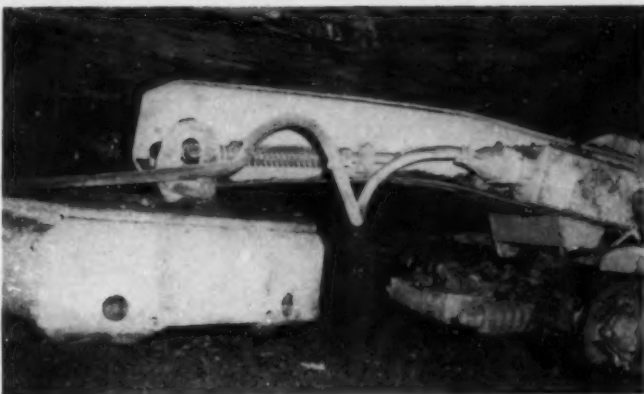
The Aflex property, located in Pike County within 2 mi of Williamson, W. Va., is one of six units in Kentucky and West Virginia turning out "Leckie Coals." W. S. Leckie is president of the several mining companies; William H. Leckie is general manager; and W. W. Coleman is mining engineer. Central operating and engineering offices for the companies recently were set up at Bluefield, W. Va. At the Aflex mines, Rudolph Matney is superintendent, Vito Ragazzo is general mine foreman and G. F. Kennedy is chief electrician.

The cost of this new system of continuous haulage is nominal if a mine already is operating with loaders discharging to room conveyors. And even if new room conveyors must be purchased, the cost still is not relatively high. Another merit of the system is that it is adaptable to continuous-mining machines.

HOW CONTINUITY IS OBTAINED

A continuous-haulage unit in the Thacker mine consists of a short conveyor that spans the gap between the loader and the room conveyor. The system was first used at Crichton No. 4 mine, Johnstown Coal & Coke Co. (*Coal Age*, August,

Here's How to Unhook the Conveyor



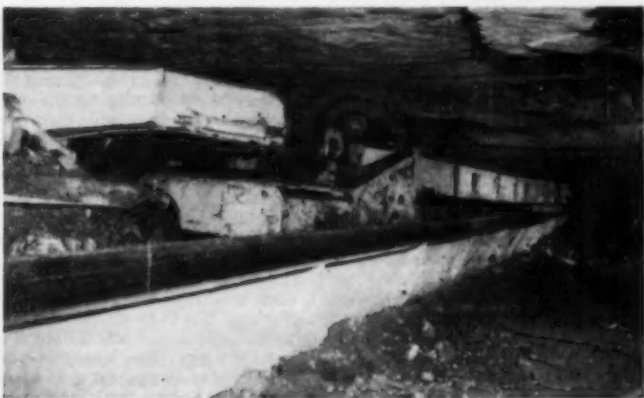
QUICK-DISCONNECT device suspends conveyor from loader boom. Safety lever-type plug-and-receptacle junction box disconnects conveyor-motor cable.



READY FOR UNHOOKING, loader and conveyor are backed up parallel to room conveyor, as one crewman adds a pan to the room conveyor.



WITH FULL-SEAM MINING, 5% of parting is picked out underground; rest outside.



NOW UNHOOKED from the short conveyor, loader starts tramping to another room where it will work with another of the gap-spanning conveyors.

How Thacker Mine Keeps Coal Moving Continuously From the Face



LECKIE COAL from two seams gets final touches in preparation plant. The 700-tpd of cleaned coal produced from each of two mines is loaded and shipped separately.



AT TRANSFER POINT, room conveyor discharges to 30-in belt as part of non-stop haulage system.



SHORTWALL CUTTER—one to each room—works here while loader and conveyor work in another room.

1950). At the Thacker mine, as well as at Crichton No. 4, Long Super Mine Car Co., Inc., provided the short conveyors, known as Piggybacks. The same manufacturer provided the loading-machine conversion booms at Thacker.

Power for the Piggyback conveyor comes from the loader through an Ensign safety lever-type plug-and-receptacle junction box containing a De-ion breaker. The junction box is mounted on the side of the loader.

When set up for work, one end of the Piggyback hangs from the loader boom and the other rides on a carriage that rolls on the room conveyor. Special yoke-shaped pivots at both ends position the discharges to prevent spillage, regardless of the angle between Piggyback

and boom or Piggyback and room conveyor. Pivot range at both ends of the Piggyback is 180 deg.

Advances up to 50 ft can be made without panning-up the room conveyor. Likewise, wide rooms can be mined and 90-deg breakthroughs can be driven. The system enables the loader operator to give all his attention to keeping the loader in the coal.

The Thacker mine, opened in 1947 at this property, delivers coal from an upper split of the Thacker seam to a tippie and washing plant. Working height in the mine is only 40 in, including 6 in of slate 4 in from the top. The immediate top is 10 in of strong sandstone. Above the sandstone is a thick stratum of fairly strong slate. Generally, there is no trouble holding top in rooms

30 to 50 ft wide. Posting in the rooms serves principally as a warning.

Bottom is hard and usually dry. The seam is generally level but has some mild local rolls on about 300-ft centers. Full-seam mining is the practice, with reject amounting to about 20% by weight. Approximately 5% of the reject is picked off the room conveyors and is discarded in the mine. The remaining refuse is eliminated at the plant by handpicking the large material, crushing the lump to 5 in and washing the crushed coal in a Jeffrey diaphragm jig.

PRODUCTION MECHANIZED

The mine was developed with Joy 12BU loaders discharging to chain conveyors which, in turn, deliver to



RETARDING BELT CONVEYOR is driven from 50 ft inby the portal. From belt discharge coal is trammed to plant 4,000 ft distant in drop-bottom cars.

belts extending out through the portal. Before the Piggybacks were installed, the rooms were driven 30 ft wide on 50-ft centers and pillars were slabbed back on retreat from the room. Thirty feet is the maximum room width with a 12BU loader loading to a room conveyor without tramping.

Wider rooms are possible with Piggybacks. The present method is to drive 50-ft rooms on 60-ft centers and abandon the 10-ft pillars. The wider rooms were started when the first Piggybacks were installed last December. But with the new mining plan there are some signs of the same roof troubles that occurred with narrower rooms and slabbed pillars. It now is questionable whether the width of rooms and pillar centers can be maintained at the present standard.

Room entries 1,500 to 3,000 ft long are developed with the Piggybacks. These entries consist of four headings to accommodate the four Piggyback units. Assuming a mine map in which the headings are numbered 1 to 4 beginning at the left and looking inby, rooms are mined only on the left-hand side of the panel. On Heading No. 2 both the panel belt and a supply track are installed, with the belt at the left of the track. Breakthroughs between Nos. 1 and 2 are on room center lines, providing space for using the Piggybacks at the start—that is, in necking the room. Breakthroughs between Headings Nos. 2 and 3 are spaced at 300 ft and accommodate the cross chain delivering to the belt during development.

Rooms are mined on retreat after the entry has been developed to full

length. Until recently at Thacker, each Piggyback always stayed in its own room, the loader being quickly disconnected when the loading was done and trammed rapidly to another room to work with another Piggyback. The short boom on the loader made fast tramping easier, and moving one loader back and forth between two Piggybacks made a highly efficient operation.

Lately, however, it was discovered that with one loader working with two Piggybacks, the high percentage of loading time was overheating the loader, especially the crawler motors. For that reason, the original loader-shuttling plan has not been followed completely in recent operations. Pending a redesign job in powering the 12BU, a third 12BU has been moved into the mine.

The third 12BU means that two of the loaders now remain connected to their respective Piggybacks and thus can cool down somewhat while the rooms are being undercut and shot. One of the loaders still is working two rooms, although the crawler motors fail every few weeks. Unless this overheating problem is soon solved, a fourth 12BU may be installed in the mine. The fourth machine would mean that no loader would do double duty. At present, the daily production of the mine comes from five Piggyback shifts.

PRODUCTION 42 TONS PER MAN

Seven men and a boss comprise the crew for two rooms, whether the equipment includes only one loader shuttling from one Piggyback to another or two loaders that

remain connected to their respective Piggybacks. On each chain-flight room conveyor one man, either the mining-machine helper or the supply man, picks slate.

Normal production for one loading machine shuttling between two rooms equipped with Piggybacks is 295 tons of material, equal to 42 tons per man including the boss. The latter figure represents about 33 tons of washed coal. Before the Piggybacks were installed, a loading machine produced 220 tons per shift, equal to 31 tons of material per man and 25 tons of washed coal.

After a room is finished, the Piggyback is moved out to the room neck by leaving it connected to the loading machine and tramping it back alongside the room conveyor. Seven feet of open space is required along that side of the room conveyor.

HAULAGE AND PREPARATION

Thirty-inch belts haul the raw coal 5,600 ft from the Piggyback workings to the portal. For carrying men and supplies, two 6 x 13-ft flat-deck 8-wheeled cars 13 in high were purchased from Differential Steel Car Co. (see p 112, this issue). A trolley locomotive pulls the cars.

The outby, or last, section of main-line 30-in belt conveyor has its drive only 50 ft inby the portal but extends down the hill to a transfer or loading point, from which the coal is hauled 4,000 ft in drop-bottom mine cars to the tippie and washer. For this duty, 75 cars are on hand. The rated level capacity of each car is 6 tons but they are consistently loaded to at least 7 tons.

MINE OUTPUT CUSHIONED

Recently a Neff & Fry storage silo and a second loading track for the mine cars were added at the transfer point (p 112, this issue). The storage silo prevents shutdown of the mine if trouble develops at the preparation plant or if the plant is still working on coal from another mine near by.

The nearby mine, in the Alma seam, produces by-product coal. The preparation plant is operated alternately for approximately 2-hr periods on the two different coals. The problem of loading and shipping the two coals separately has been solved by using two slack tracks and handling two railroad cars on the stove track and two on the egg track. The plant ships about 1,400 tpd of cleaned coal—some 700 tons from each mine.

Mechanized Pay-Roll and Cost Accounting—Step by Step . . .



1 PROCESS CONTROL—In processing payroll for 12,000 employees, payroll clerks (left) receive timebooks from mine and shop supervisors and insert total hours. Clerks in file-control section (right) then match prepunched cards to timebook items.



2 CONVERSION—Key-punch machine operators initiate the mechanized accounting by transferring hours and other vital facts from timebooks to punchcards. Verifiers (right), using machines designed for the purpose, check the work of punch operators.

Streamlined Paperwork

Paying Glen Alden's 12,000 Men Is No Small Job . . . Here's How Business Machines, Including an "Electronic Brain," Speed Pay-Roll Preparation, Help Figure Depletion and Royalties and Tighten Cost Control

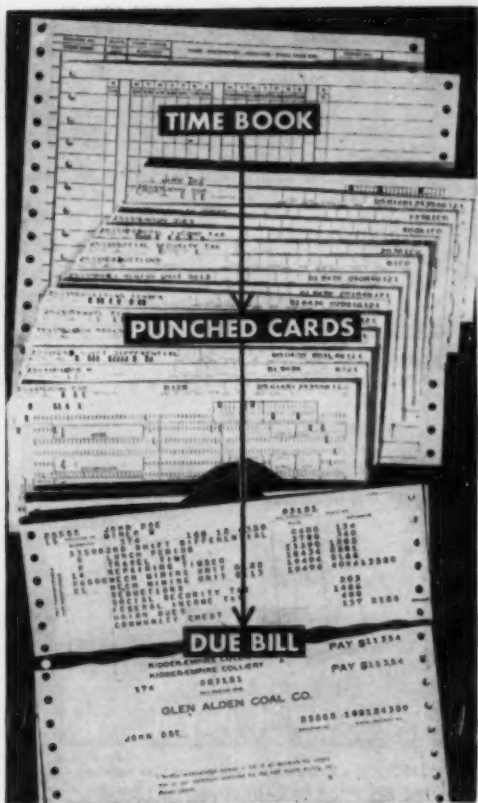
TWO FACTORS which influenced the application of machines to coal mining and preparation—economy and efficiency—have also led to the mechanization of accounting and pay-roll procedures in many coal company offices. The ever-increasing load of necessary paperwork demanded such measures if office staffs were to be held to reasonable size.

In response to these stimuli, Glen Alden Coal Co., Scranton, Pa., has

installed a battery of integrated International Business machines to help keep the records straight. Among the units in this accounting assembly line is an auxiliary known as an IBM electronic calculating punch or "electronic brain," and the presence of this machine indicates the extent to which Glen Alden has streamlined its paperwork.

As to the need for streamlining, consider the extra details that must be handled by the pay-roll depart-

ment of a coal company. In addition to straight rates for an underground employee's primary occupation, there are special considerations not commonly encountered in other industries, such as intricate "contract miner" incentive pay schedules, paid lunch periods, travel time, etc. There are more than 30 separate earnings items involved in a typical mine pay-roll. Then there are, in all, some 26 possible separate pay-roll deductions such as federal taxes, state or local taxes, retail coal purchases, union dues and assessments, Social Security deductions, U. S. savings bond allotments, and contributions to charitable organizations. In addition to these 26 deductions is a further deduction made from a "con-



3 COMPILING—Sorting machine (top) isolates cards carrying specific facts. Collating machine (bottom) reinserts them.

KEY FORMS help Glen Alden increase office efficiency and economy to keep pace with increasing paperwork. **MORE** ➡

tract miner's" pay for wages paid by the company to his laborers. The preparation of pay rolls for Glen Alden's more than 12,000 employees was a very large job for the staff of clerks formerly engaged in handling the assignment on a manual basis.

That's where the machines shine. They quickly and efficiently perform large volumes of repetitive work without exerting themselves or their operators.

WHAT THE SYSTEM DOES

Although pay-roll production is the main function of Glen Alden's office machines and consumes two-thirds of the working time of the equipment and operators, other problems are successfully handled for the accounting and engineering departments. For example, progressive depletion of coal reserves is computed and recorded by the IBM units from information taken from mine-car tickets as the loaded cars

arrive at the mine portals. The depletion records may be broken down to show cumulative recovery by vein, section, colliery or company, as desired. These calculations formerly were a burden on the engineering department.

From calculating depletion, it is only a short step to computing royalties or determining property taxes, two other jobs handled with comparative ease by the accounting assembly line.

Furthermore, the machines are of great value in tightening the company's cost control because of their ability to isolate a useful cost figure quickly.

Finally, the invoices which accompany market-bound railroad cars to their destinations are printed by accounting machines from information contained on standard IBM punched cards. The cards from which the invoices are printed are filed as accounts receivable; then when payment is received the

cards are withdrawn from accounts receivable, punched to show receipt of payment and filed again as entries in the "cash book." The cards are automatically filed and withdrawn by collating and sorting machines to provide fast, accurate and smooth billing and receipting on "blue coal" shipments. These cards are subsequently used for sales analysis.

MECHANIZING AN OFFICE

A great deal of mental spade-work by Glen Alden's accounting department, headed by M. B. Nunlist, controller, was necessary before the machines were ordered or installed. It was definitely established by Mr. Nunlist and his aides that (1) the volume of work was great enough to adequately load such machines, (2) that costwise, mechanized accounting would favorably compare with other methods of doing the work and (3) that the office could be organized and pres-

"Almost-Human" Machines Automatically Calculate Glen Alden Pay Roll



4 COMPUTING—"Electronic brain" (left) multiplies hours by rate, checks its own work and punches the answer into card. Accounting machines (right) "read" cards and print gross earnings, deductions and net earnings on employee duebills.



5 PROJECTION—Reproducing machine copies earnings cards of current pay period to make prepunched cards for next pay period. Timebooks also are reproduced automatically.



6 MACHINE CONTROL—G. W. Nichols (left), general auditor, looks on as W. F. Meier, tabulating-section supervisor, shows assistants fine points of wiring a machine-control board.

ent personnel trained to handle the work efficiently.

Accordingly, these findings were presented to the management of the company and Mr. Edward Griffith, president, approved the rental of IBM equipment to convert to punched card accounting. This work was started about a year ago.

The personnel was organized to handle pay-roll accounting on a punched card basis in a pay-roll department headed by H. T. Davis and an IBM department headed by W. F. Meier. The whole operation was supervised by R. J. Barber, assistant controller, and G. W. Nichols, general auditor. To assure a smooth procedure of transition, C. F. Bennett was put in charge of a newly created section for that purpose.

The use of the new office machines is best illustrated in the operations of the pay-roll department, which consists of subdivisions as follows:

1. A clerical section where a corps of pay-roll clerks prepare col-

liery and shop timebooks for processing.

2. A file control section where standard IBM prepunched cards are matched to the items in the timebooks.

3. A keypunch section where punch- and verifier-operators convert the timebook's information into properly-placed holes in the proper punchcards.

4. A tabulating section where this information, in the form of punched holes, is used by the machines to calculate gross earnings, subtract authorized deductions, reproduce a new timebook and print employee duebills (i.e., earnings statement).

The four subdivisions are staffed by 65 employees.

PAY-ROLL FLOW CIRCUITS

The entire pay-roll load was not dumped suddenly on the new system. A reasonable number of timebooks was converted during each month, the entire transition requiring 10 mo. While there was a

change in the form of the timebook, there was actually no change in the method of recording time therein at the collieries.

The initial step in converting a timebook to the new system is the preparation of a deck of IBM cards for each employee carried in the book. As shown in the illustration, the deck includes a name card, occupation card and individual cards for each item that contributes to the employee's earnings. The items differ either in rate or work classification, thus necessitating a separate card for each.

At the close of a pay period, the books are sent from the colliery to the clerical section of the pay-roll department, where the hours per item are tallied and inserted by the pay-roll clerk. His work is checked by another clerk and the book sent to the file-control section.

The file-control clerks withdraw the deck of cards used to print the original time book and forward the cards and the book to the key punch section.

The prepunched cards carry control information, such as the work classification, employee's number, rate of the job and so on. In fact they include all information in the form of punched holes except the hours for the credit item to which the card applies. The key-punch operators punch these timebook quantities in'o the cards and the verifiers check their work.

The stack, with cards in the order of corresponding items in the timebook, is sent to the tabulating section.

FIGURING EMPLOYEE WAGES

Before anything else is done in the tabulating section, the incoming cards are used to project the system into the next pay period. The stack of cards is fed to a reproducing machine which interprets and punches a duplicate set of cards with only the holes representing hours omitted. The duplicates are the prepunched cards, referred to earlier, from which the file control clerks will initiate the processing for the next pay period.

However, before the duplicates are returned to the file-control section they are fed to an IBM machine which interprets the control information punched into the cards and prints that information across the upper portion of the cards. Cards are forwarded to the tabulating machines where the new timebooks are printed from these cards. The pages of the new timebook leave the accounting machine as a continuous form, and they are later separated and put in ring binders.

Thus, key-punch operators are required to punch control information only once for each employee. Thereafter, reproduction is automatic.

The original cards, which contain rate and hour intelligence, then are used to complete the preparation of the current pay-roll.

An IBM collating machine inserts a working summary card after each employee's deck in the stack. The blue-bordered summary card carries the previous earnings-to-date total and permissible tax exemptions of the employee. Now the stack, which represents all the wage credits entered in the timebook, is ready for insertion into the electronic calculating punch.

WHAT THE "BRAIN" DOES

The calculating punch consists of two units: (1) the calculating unit where more than 1,400 electron tubes labor at the speed of light to

perform the desired calculations, and (2) an interpreting and punching unit which reads the problem, feeds it to the calculator and punches the resulting answer in the proper column of the card in the works. While capable of performing thousands of calculations per minute, the electronic unit is limited to the speed at which its "fingers" can efficiently punch answers into the cards.

Discretion being the better part of valor, no attempt will be made to give a technical explanation of the calculator's inner workings because of the 1,400 tubes previously mentioned. In lay language, however, here is what the machine does.

Contact brushes sense the information represented by the punched holes. Contacts thus made cause the calculator to multiply the rate times the hours and punch the result in the proper place on the card. The machine is so wired that it can check its own work simultaneously. When the summary card is presented to the brush mechanism the machine recalls the preceding calculations, adds their results and punches the sum in the current-earnings column of the summary card. This figure is the gross earnings of the employee whose deck closes on that summary card. Also, the unit adds current earnings to the previous earnings-to-date total for the year and punches the new earnings-to-date figure in the proper column of the summary card. All this is done at the rate of 100 cards per minute.

The machine is monitored in the functions it performs by a manually-wired control board which is inserted into the side of the unit. Each type of problem requires its own control board, but since the types of problems are repetitive the control boards are set up once, then filed when not in use.

Upon completing the calculation of gross earnings for all employees in one timebook, the control board is changed and the unit is ready to compute taxes and Social Security deductions. In doing this, the machine must read the employee's current earnings, make allowances for his dependents and multiply the taxable portion of his earnings by the appropriate percentage. The results are punched into the proper columns of the individual tax field of the summary card.

In computing Social Security deductions, the machine exhibits almost human judgment. If earnings-to-date exceed \$3,600 no deduction

is made. If current earnings will cause the new earnings-to-date figure to exceed \$3,600, only the proper proportionate deduction will be calculated.

The stack is then returned to a sorting machine which removes the summary cards. Deduction cards, previously referred to, have been prepared representing standard deductions, i.e., union dues, bond deductions, etc. These are next meshed in with the stack of cards. The stack is transferred to the accounting machines which print duebills from the punched card information.

As the accounting machine reads each card it interprets the information thereon into a single printed line on the duebill. The duebills, printed in triplicate, leave the accounting machine as a continuous form with earnings and deductions summed up and the proper subtraction made. The employee's pay envelope is pasted to the reverse side of the duplicate which is sent to the treasurer's office after the duebills are separated. The system could be applied to writing checks, but payment in cash is customary in the anthracite industry.

The envelopes are filled at the treasurer's office, then moved to the pay windows at Glen Alden's 14 collieries and other properties to complete the process of making sure that the employees get their earnings accurately and in full.

Upon the completion of all the operations, the name, occupation and deduction cards are removed by the use of a sorting machine, and the remaining cards then become available for cost analysis.

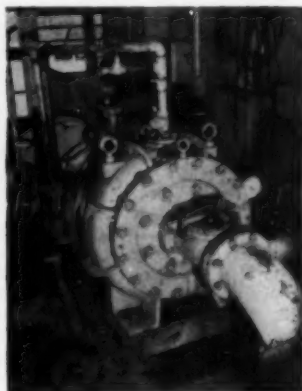
BY-PRODUCT DATA VALUABLE

The costs of operation on the new punched card basis have been financed by over-all savings resulting from punched card application on a large scale. Taking into account that use is made of the machines for general accounting work, sales and expense analysis for Glen Alden and all its various subsidiaries, and various other applications, the company is of the opinion that the transfer to punched cards has been advantageous.

The IBM units as now utilized have made readily available as an inexpensive by-product of the payroll job much cost control information heretofore hard to get. The management believes that such cost accounting by-products will prove to be the most valuable result of the change to punched card methods.



FROTH-FLotation PLANT (left photo) turns out 40 tph of cleaned fine coal from 80-acre sludge pond on which dredge floats (right). Operator controls density of slurry intake with boom-mounted cutter. Dredge is powered by pontoon-floated cable.



RADIOACTIVE GAGE (left photo) on dredge discharge pipe measures density of outgoing slurry by means of gamma rays. Density Indicator (center) tells operator whether to withdraw cutter and intake from bank or push them farther in. Big pump sends slurry through 1,500-ft pipeline to plant.

United Electric's Fidelity Mine Shows How You Can . . .

Cash In on Your Sludge Pond

To Recover 40 Tph of Marketable Coal With Only Five Men, Fidelity . . .

Dredges an 80-Acre Sludge Pond

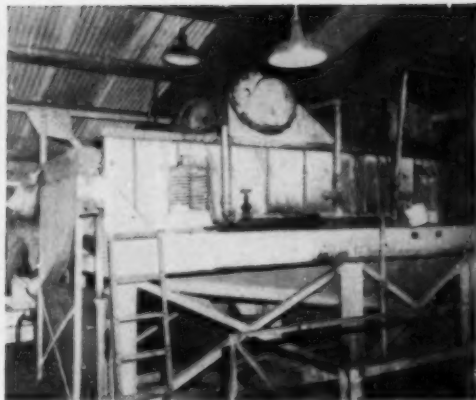
Pumps Slurry 1,500 ft to Plant

Uses Flotation Cells and Tables

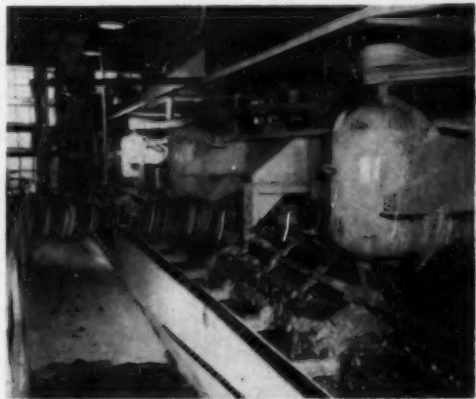
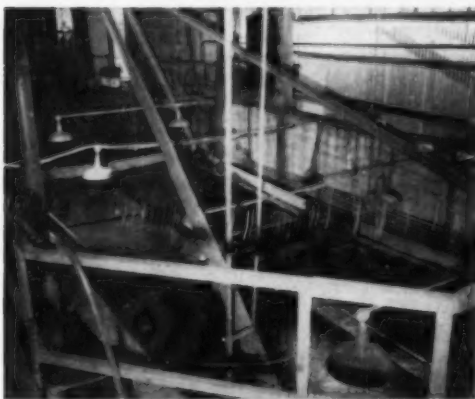
Dries Product in Vacuum Filters

A FROTH-FLotation PLANT built as an annex to the main preparation plant is producing 40 tph of marketable fine coal from an old sludge pond at the Fidelity mine, United Electric Coal Cos., DuQuoin, Ill. At present, the flotation plant runs on slurry pumped from the sludge pond. Eventually, it will run one shift on wastes from current output in the main plant and two shifts on sludge-pond slurry.

The sludge pond, measuring about 80 acres and averaging 25 ft



TWIN MINERAL JIGS (left photo) discharge minus 2-mm pulp to agitators for conditioning before entering flotation cells. Cell tailings are sent through distributor to three concentrating tables after passing over dewatering screen (right photo).



ONE TABLE CLEANS 2-mm $\frac{3}{4}$ -in from primary vibrator, with the three others handling flotation tailings. Tabled coal is dewatered on vibrating screen and mixed with filter-plant product.

FLOTATION CELLS—two banks of eight each—clean minus 2-mm from agitators. Coal is floated by tiny air bubbles. Final concentrate goes to filters; others are recirculated.

in depth, is estimated to contain 2,000,000 tons of coal. Ash in the pond material averages about 35%, varying from a low of 10% in some areas to a much higher figure near the points where plant wastes were discharged and where the principal impurities—fireclay, calcite and sand—first settled out. Sulphur runs about 3 $\frac{1}{4}$ %. Size consist averages about as follows: plus 10-mesh, 32%; 10 x 48-mesh, 45%; minus 48-mesh, 23%. About 65% of the raw feed to the flotation plant is recovered as a 10%-ash product.

HOW DREDGE PUMPS SLURRY

Material from the pond is pumped as a slurry to the flotation plant, the slurry being prepared by circulating part of the waste water from the main plant to the sludge-pond.

In the future, when main-plant wastes will be conveyed directly to the flotation plant on the day shift, fresh water will be used to make up the sludge-pond slurry on the second and third shifts.

A dredge, equipped with rotating cutter blades mounted at the end of an adjustable boom, "mines" the sludge pond. Wire ropes passing over winches and sheaves on the dredge and secured to stakes on dry land enable the operator to maneuver the dredge as needed. At each corner of the squared-off stern, vertical 8-in. steel spuds, one of which is always driven down into the solid beneath the pond, provide purchase for cutting into the sludge-pond bank. To move forward or backward, the operator pays out or reels in the wire ropes so as to

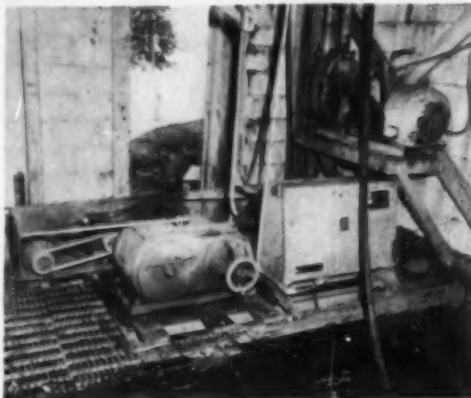
pivot the dredge first on one spud and then on the other, thus "walking" the dredge in the desired direction.

The cutter, tailor-made by the Meckum Engineering Co., Chicago, has five curved blades which, rotating in a vertical or near-vertical plane around the mouth of an intake pipe, cut into the sludge bank below the water level. The cutting action feeds slurry to the intake and, at the same time, caves the semi-dried bank of the sludge pond. The aim is to drive the cutter into the sludge at such a rate as will provide a slurry containing 20% solids. At this rate, plant feed will total about 60 tph of solids. The specific gravity of the pulp as pumped by the dredge pump is only 1.05 to 1.06. Average apparent

How Fidelity Recovers Marketable Fines From an 80-Acre Sludge Pond



TWIN FILTERS with eight disks each (left photo) reduce surface moisture of flotation-cell coal to 15%. Filter cake drawn onto disks by vacuum system is discharged into troughs and conveyed to stacker belt, where it is mixed with tumbled coal and dropped onto stockpile. Cleaned fine coal stacked outside filter house is shown at right.



DRAG BUCKET hauls coal into a hopper, whence it goes to main plant through an automatic weighing device that controls loading. Fine coal is mixed with the main-plant products.



BRAINS OF THE FINE-COAL PLANT—George Boggis (left), plant foreman; Lowell Malan, preparation manager; and R. P. Kloepper, flotation technician.

specific gravity of the solid in the pulp is about 1.35. The cutter is driven by a shaft connected to a 15-hp motor mounted on the boom.

CONTROLLING SLURRY DENSITY

At the start of operations several months ago, the dredge operator could only guess at the solids content of the slurry being pumped to the flotation plant and had to depend on telephone messages from the plant operator, 1,500 ft away, for adjusting the penetration of the cutter. The resulting time lag, with improperly proportioned slurry already filling 1,500 ft of pipeline, resulted in an uneven flow of material to the plant. Recently, however, a Gagetron has been in-

stalled on the discharge pipeline at the dredge to measure consistency of the plant-bound slurry.

The Gagetron, manufactured by Instruments, Inc., Tulsa, Okla., consists of a Geiger counter and two brass jackets, each of which contains a small quantity of radium. Jackets and counter are attached to the pipeline so that gamma rays from the radium pass through the pipe walls and slurry and register in the counter on the opposite side of the pipe. The reaction of the counter, transmitted to a calibrated indicator at the dredge-operator's station, is an accurate inverse measure of the density of the slurry flowing through the pipeline. If the density is low, the operator pushes

the cutter deeper into the sludge; if high, he backs the cutter away.

Power for the dredge is tapped from a nearby highline at 4,400 v. conducted to the dredge through a Simplex submersible cable floated on pontoons and stepped down to 440 v by three 375-kva transformers in the dredge. The dredge requires a two-man crew—one as pumper and another as a helper-oiler. Life jackets are hung in the operator's cabin and a small rowboat provides a dry passage to and from the shore.

Slurry is pumped from the dredge by an 8-in Morris dredge pump powered by a 125-hp Crocker-Wheeler motor. Vertical lift from pond to plant is about 30 ft.

CLEANING THE SLURRY

In the flotation plant, slurry pumped from the pond first passes over a 5 x 10-ft double-deck Gyrex screen for dewatering and sizing. The plus $\frac{3}{4}$ -in raw feed from the top deck goes to an American ring pulverizer and is returned to the top deck for rescreening. The $\frac{3}{4}$ -in x 2-mm size from the lower deck goes directly to a Wilfley table located alongside three other Wilfley tables that clean the plus 28-mesh tailings from the flotation cells.

Minus 2-mm material from the Gyrex screen is passed to a 50-ft thickener. Overflow from the thickener goes to refuse. Underflow passes through two adjustable-stroke Denver Duplex diaphragm pumps and a 6-in Wemco sand pump into a splitter, where the stream is distributed into two parallel cleaning circuits, each with its own bank of eight flotation cells. Density of the feed is controlled by adjusting the stroke of the diaphragm pump.

PARALLEL CLEANING CIRCUITS

In each cleaning circuit, the minus 2-mm material is fed to a Denver Duplex mineral jig with two compartments, each 24 x 36 in. Concentrate from the jig—mostly pyrites and sand—goes to refuse. Overflow from the jig is discharged to a 10-ft Wemco agitator, where the pulp is thoroughly conditioned for the flotation cells. The conditioning reagent now used at Fidelity is No. 1 distillate. Since the oil has a greater affinity for coal than for fireclay and other impurities, it coats the coal particles first. For that reason, quantity of distillate used and conditioning time are important. About 9 lb of oil is used per ton of clean coal. Conditioning time is about 6 min.

The flotation cells—Denver No. 30 Sub-A units, 56 x 56 in—receive the pulp overflowing from the agitator. Assuming a flow sheet in which the cells are numbered 1 through 8 from left to right, the pulp first enters Cell No. 7. There, the frothing agent—a mixture of methyl-amyl alcohol and pine oil—is added. About 0.3 lb of frother is used per ton of clean coal. Thousands of small bubbles created by aerating the pulp and the frother float the oil-coated coal particles to the top of the cell, where paddles rake the floated coal into a collecting trough. The product from No. 7 cell is final concentrate. It is transferred by means of a 4-in Morris sand pump to the filter plant for drying.

Unfloated coal and other materials from Cell No. 7 pass to Cells Nos. 6 and 5. Flotation products from these two cells are transferred to Cell No. 8, where they are refloated and join the final concentrate from Cell No. 7 in its journey to the filter plant. Underflow from Cells Nos. 6 and 5 passes to Cell No. 4, where more frother is added, and, serially, to Cells Nos. 3, 2 and 1. Floated products from these last four cells are recirculated through the system beginning at Cell No. 6.

Tailings from the cell banks, including coal that is too coarse for the cells to float, are drawn off at Cell No. 1 and passed over a 4 x 16-ft Robins Eliptex dewaterizer equipped with a 28-mesh screen. Minus 28-mesh material—mostly fireclay and fine sand—goes to refuse.

Screen oversize from the Eliptex dewaterizers in both circuits is discharged to a pulp distributor, which feeds the material equally to three 6 x 14-ft Wilfley tables for separation of coal and impurities. Tailings from these three tables are pumped to refuse. Clean products, mixed with the 2-mm x $\frac{3}{4}$ -in product from the first Wilfley table, mentioned earlier, are pumped to a 5 x 16-ft Allis-Chalmers Low-Head vibrator, located in the filter plant, for dewatering and stockpiling with the filter-plant products.

HANDLING CLEANED COAL

The filter plant processes floated coal from the two cell banks. Twin 6-ft Eimco revolving filters, each equipped with eight disks and a vacuum system, make a cake of the fine coal and discharge it to the stockpile. The filters reduce surface moisture to about 15%. Further drainage occurs in the stockpile. Filter cloth is Saran, woven of synthetic fibers, or cotton duck.

Each vacuum system includes a 9 x 22-in Ingersoll-Rand vacuum pump and snubber, a primary and secondary vacuum tank, and a 2-in Jennings filtrate pump. A Roots blower removes the cake from the filter cloth. Water and extremely fine material drawn through the filter cloth on the disks pass into the primary vacuum tank and are pumped to refuse through the filtrate pump. The secondary vacuum tank serves as the moisture trap for the vacuum system.

Cake from the filters, mixed with products from the four washing tables, is conveyed via a stacker conveyor to the stockpile outside the filter plant. A Sauerman drag with a 2-yd bucket operated from the

filter plant pulls stockpiled coal into a big hopper, whence it is fed through a Merrick Feedoweight with Reeves variable-speed drive to a flight conveyor and into the main preparation plant. There it is blended with coarser products from the main plant. Discharge from the Feedoweight can be varied from 15 to 175 tph.

COAL SAMPLED REGULARLY

To check plant performance, samples are taken every 30 min of the raw feed, cell and table products, and final refuse, and are rushed to a well-equipped laboratory for ash and moisture analyses. Denver automatic samplers are being installed at all checkpoints except the tables. Specific gravity of the slurry in the cells also is checked regularly and frequently by means of a gravimeter. In the near future a Gagetron like the one at the dredge probably will be installed to provide a continuous density check.

The Fidelity froth-flotation plant was erected by Western Machinery Co. according to an original design by Denver Equipment Co. The Denver organization based its design on a small pilot plant set up to treat the Fidelity slurry.

The froth-flotation plant now works one shift per day. It requires the services of one foreman, two men on the dredge, one man in the flotation plant and one man in the filter plant. George Boggis is foreman. R. P. Kloepper is consulted on flow-sheet and reagent changes looking to improvement of the operation. He also conducts research in the pilot plant, which is a miniature of the big plant. Much of the data and know-how that went into construction of the plant and now guide its operations came from Lowell Malan, United Electric's preparation manager. E. E. Laurell is general superintendent of all Fidelity operations.

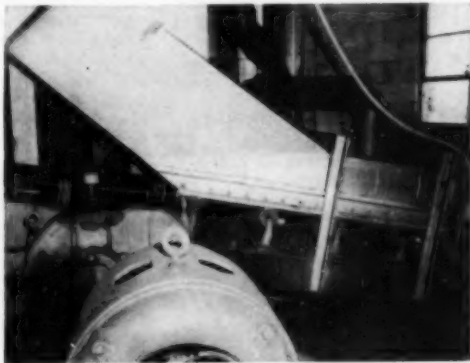
Although operating costs of the sludge-treating plant are not available, this much can be said: Actual treatment of the sludge costs more per ton than treatment of coarse products run through the main preparation plant, but these extra costs are offset by the absence of any charges for drilling, shooting and removing overburden, loading coal out of the pit, and transporting it to the plant. Sold at a fair profit, the fine products, mixed with coal from the main plant, make an excellent and easy-to-handle fuel for industries having facilities for using pulverized coal.



NEW BELT CONVEYOR brings coal to the tipple and preparation plant modernized by addition of washing equipment and other facilities. Dump hopper and monitor incline for Lower Hignite mine on opposite side of the valley are shown at the right.



GALLERY HOUSING protects top and side from which rains come, leaving other open for inspection and greasing.



HOOD, DUCTS AND EXHAUST FAN at feeder discharge to belt keep dust out of the motor room.

Pruden Installs Belt Conveyor and Drop-Bottom Cars for . . .

Low-Cost Transportation

Half-Mile Belt Conveyor Connects New Portal to Old Plant—Dump Hopper for Drop-Bottom Cars Provides 600 Tons of Storage Capacity—Design and Construction Handled by Pruden Coal Co. Engineers

ECONOMY AND EFFICIENCY in transportation were primary goals of the Pruden Coal & Coke Co., Pruden, Tenn., in opening its fourth mine in 45 yr of operation to increase capacity and replace the tonnage of the Lower Hignite mine, which is being worked out.

In addition to drop-bottom cars, the steps taken to reach these goals included installation of a 2,590-ft belt conveyor to carry coal from the new portal to the existing washing plant.

Design and installation of the facilities, including a 600-ton

dump hopper, feeder and drive, in addition to the belt conveyor and cars, were handled by the coal-company engineering staff. D. E. Griffith, president, with considerable experience in mining engineering and maintenance, supervised the broader aspects of the job. E. B. Cross, mining engineer, handled the details. They believe that they have achieved the goals of long life, trouble-free operation and low maintenance.

Installation of drop-bottom cars, with their attendant simplification of dumping, was a natural step. The late C. A. Griffith, father



SCALE HOUSE and dump hopper at the new mine in the Rich Mountain seam. The hopper is roofed for protection.



SIDE PRESSURE in the new 600-ton dump hopper for the drop-bottom mine cars is resisted by closely spaced steel columns.

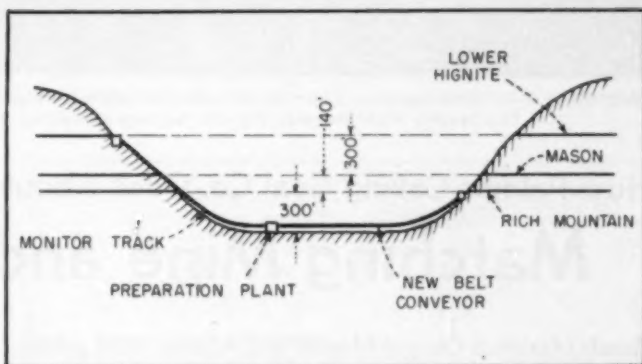
of D. E. and vice president and general manager of the company for many years, invented the drop-bottom car, and Pruden has used the Sanford-Day "Automatic" type for many years.

While the company's operating office at Pruden is in Tennessee, the preparation plant $\frac{1}{2}$ mi up the hollow is in Kentucky, as is most of the mining territory. As shown in the drawing, the company opened its first mine in 1906 in the Mason seam on the right-hand side. The Black Creek mine, on the left-hand side, was opened in the same seam in 1914. In 1934 a mine was opened on the left-hand side in the Lower Hignite seam, and in that year also a new tippie and washing plant were completed. This equipment, still in use, and improved from time to time by addition of vibrating screens and changing the arrangement of conveyors, includes two Jeffrey diaphragm jigs and one CMI centrifugal drier.

The new conveyor, continuous for its length of 2,590 ft between head and tail pulleys, carries a 36-in Republic belt, 5x7-ply, $\frac{3}{16}$ -in rubber on the carrying side and $\frac{1}{16}$ on the pulley side.

Frames, in 30-ft sections, were fabricated by J. R. Hoe & Sons, Middlesboro, Ky. One end of each section has a slotted foundation-anchorage hole to provide for expansion. Idlers, purchased from Barber-Greene, have greasing-type anti-friction bearings and the greasing connections are arranged together at one side.

A corrugated curved galvanized steel housing protects the top and one side from weather. This is



NEW BELT CONVEYOR and Pruden preparation plant in relation to coal seams being worked (looking up the valley).

satisfactory because practically all of the driving rains come from one direction. Leaving the other side open is a considerable advantage in inspection and greasing.

No chances were taken in the design of the steel hopper. Heavy, closely spaced steel columns on both sides resist the pressure of the coal with a large factor of safety. The single track over the dump hopper is roofed for protection from rain.

A reciprocating feeder driven by a 5-hp motor is used between the bottom of the hopper and the belt. A housing over the feeder discharge and an exhaustor to the atmosphere keep the motor room comparatively free of coal dust.

Motor, reducer, head pulley and bearings served previously on a belt conveyor used in building the Fontana Dam and were purchased

from TVA. This motor, a 2,300-v wound-rotor unit rated at 75 hp, is larger than necessary. Its principal duty is retarding and, at full load on the conveyor, it regenerates about 50 kw to the line.

At present this equipment is delivering 1,000 tons a day to the preparation plant. Half is from underground workings in the Rich Mountain seam and the remainder from outcrop stripping in the Mason seam 200 ft above.

The Pruden Coal & Coke Co. has a progressive record of applying modern equipment and building for the future. This new conveyor is ready to deliver a large tonnage to the plant as the Rich Mountain tonnage is increased. It also can be utilized for another seam which may be opened if a practical method—perhaps auger mining—is developed for thin coal with bad top.



STRIPPING OF A 40-FT SEAM supplements deep mining and washing for efficiency and quality at operations of the Palmer Coking Coal Co., Black Diamond, Wash. The company operates four deep mines and one strip pit within 5 mi of the plant.

How Palmer Coking Coal Co. Goes About . . .

Matching Mine and Market

Goal: Maximum Output Market Will Absorb With a Minimum Investment in Mining and Preparation Facilities

Procedure: Stripping to Supplement Deep Mining, With Mechanical Cleaning for a Better Fuel Value

By WARREN E. CRANE, Seattle.

FOR MAXIMUM EFFICIENCY in production and preparation, the Palmer Coking Coal Co., of Black Diamond, Wash., supplements deep mining with stripping and



INITIAL LOADING STEP in No. 12 pit (left). Earlier, in 1947, a scraper was used for recovering the final lift of coal in the bottom of the pit, as shown at the right. Stripping depth, ranging from 40 to 100 ft, averages 80 ft.

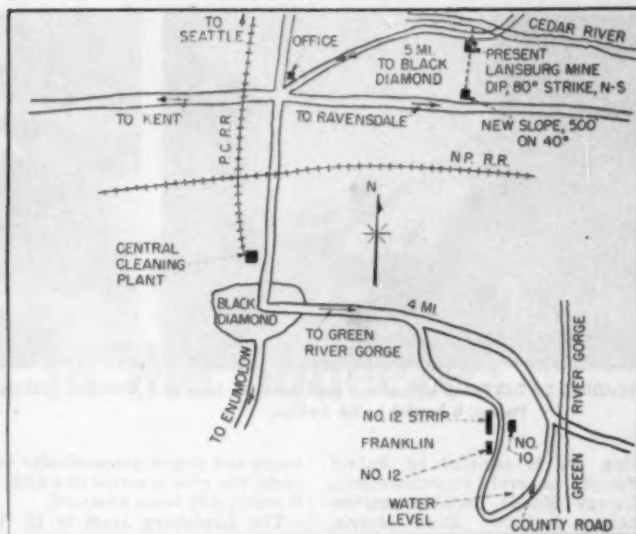
both with mechanical cleaning in a central plant. The goal is the highest output the market will absorb with a minimum investment in production and preparation facilities.

For an average output from four deep mines and one stripping of approximately 300 to 325 processed tons per day after cleaning, the working force averages 75 men. Stripping is done only in the summer months. The company mined 70,000 tons in 1950 and expects to produce 100,000 tons in 1951. The workings are within a 5-mi radius of the washing plant.

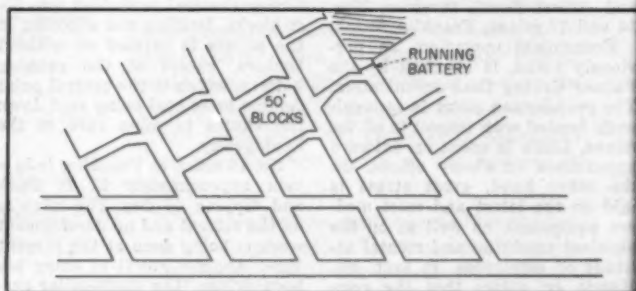
MANAGEMENT AND PREPARATION

The Palmer Coking Coal organization was established in 1908 in the town of So. Willis, Wash., by five brothers: Jonas Morris, president; Edward Morris, vice president; John H. Morris, secretary and general manager; William Morris, treasurer; and Abe Morris, deceased. The executive organization also includes Frank Merritt, a brother-in-law.

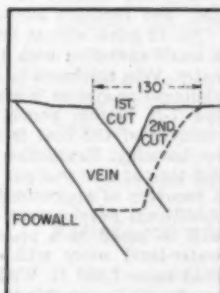
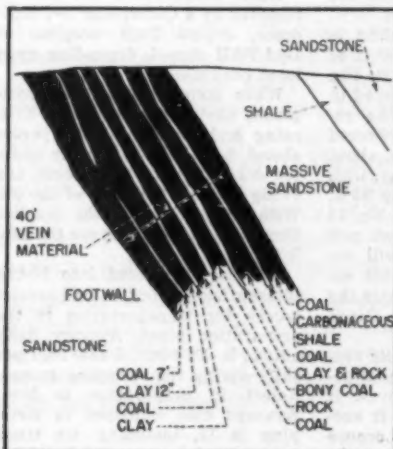
The family has demonstrated its ability to work together and has constantly increased the scope of its operations. In addition to the four active properties—three deep and one strip—the company also has inactive mines at Occidental and Durham. At the present time active management is being taken over by the second generation and younger men of the organization. Jack Morris Jr., who studied mining engineering at Washington State before service in World War II, is assistant manager in charge of all opera-



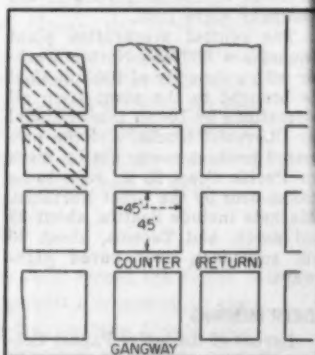
ACTIVE PROPERTIES of the Palmer Coking Coal Co. feed into the central preparation plant over county and state highways.



RUNNING-BATTERY mining system is employed in deep mining at Landsburg.



SEAM AND OVERBURDEN CONDITIONS at Franklin No. 12 strip mine (left). Overburden is removed in two cuts, as a general rule, as shown above, using dragline, shovel and bulldozer as conditions indicate.



CHUTE-PILLAR system serves No. 10 mine. A similar plan, supplemented by booming of the top bench, is used at the Franklin No. 12 operation.



LOADING OF THE FINAL LIFT, after a small shovel has taken off the top, is handled by the dragline.



CENTRAL PREPARATION PLANT receives coal by truck and uses a Baum-type washer for cleaning.

tion. He is assisted by Robert Pierce, general superintendent; George Morris, outside maintenance engineer; Evan Morris, purchasing agent and office manager; J. Gordon Addison, engineer; A. S. Simmons, foreman, Landsburg mine; Thomas Maks and Albert Rossi, foremen, Nos. 10 and 12 mines, Franklin, Wash.

Economical operation, as previously noted, is stressed by the Palmer Coking Coal organization. The preparation plant is conveniently located with respect to all the mines. Little is spent on outward appearance or showy offices. On the other hand, great stress is laid on the latest and most modern equipment, as well as on the physical condition and mental attitude of employees. In fact, Mr. Morris Jr. states that the company prides itself on its worker morale. There has not been a fatal accident at the properties of the company since 1943.

The central preparation plant includes a McNally-Norton washer with a capacity of 100 tph. Coal is brought to the plant from all operations by 10-ton International or Chevrolet trucks, and the prepared product moves out by truck or Pacific Coast R. R., soon to be taken over by the Great Northern. Markets include Seattle, about 35 mi north, and Tacoma, about 30 mi southeast, over paved highways.

DEEP MINING

Layout of the active Palmer Coking Coal properties is shown in the accompanying sketch. Landsburg mine is 5 mi from Black Diamond in an area that must have experienced a terrific earthquake in ages past, since the terrain is very

rough and almost perpendicular in spots. The mine is served by a 4,000-ft entry, still being advanced.

The Landsburg seam is 18 ft thick and dips 80 deg. Mining is done by what is known as the full-pillar system, very similar to stoping in a hard-rock mine. For pillaring, the coal is divided into 50-ft blocks. Drilling and shooting in the pillars is carried on without timbers, except at the running battery, which is the central point for the loose coal being sent down the chutes to mine cars in the haulage way.

No. 10 mine, at Franklin, is in a vein approximately 17 ft thick and dipping 45 deg. The mine is on the retreat and no development work is being done at the present time. About 4,000 ft of entry has been driven. The chute-pillar system of mining is employed, with a 9-ft bench. Production is approximately 300 tons of raw coal per day, and recovery averages 60%.

No. 12 mine, also at Franklin, is a small operation with 1,000 ft of entry. Vein thickness is 40 ft. The chute-pillar system is employed in the 7-ft bottom bench. The remainder of the coal is recovered by booming. Production is about 200 tons of raw coal per day, with a recovery of approximately 50%. Additional development at No. 12 will be based on a proposed new water-level entry which will extend some 7,000 ft. With this entry it will be possible to enter the workings at river level in Green River Gorge.

The No. 12 vein at Franklin represents one of the largest coal deposits in the area. However, it was not possible to work it successfully in earlier days because the clay and coal could not be

separated efficiently and profitably prior to installation of the McNally-Norton washer at Black Diamond.

STRIPPING

The Palmer Coking Coal stripping operations are conducted in the same vein deep-mined by No. 12. As noted, coal thickness is 40 ft; pitch, 45 deg. The overburden is massive sandstone. Average stripping depth is 80 ft; maximum, 100 ft; minimum, 40 ft.

Stripping is carried to its maximum depth before the coal is loaded. Drilling is done with a Sullivan wagon drill and Sullivan air hammers, using Timken Rockbits. Holes are 2½ in in diameter and 18 ft deep on a spacing of approximately 7 ft. Average explosive consumption (du Pont and Atlas) is ½ lb per cubic yard of rock.

After preparation, the rock is removed by a Caterpillar D-7 bulldozer, 1½-yd P&H dragline or 1-yd P&H shovel, depending upon local conditions.

When stripping has been completed, the coal is loaded in lifts, using a ½-yd Link-Belt Speeder shovel, down to the minimum width the dragline, with 50-ft boom, can swing between the walls of the pit. With a 1½-yd bucket the dragline then is employed to remove the final lift of coal.

The coal is loaded into 10-ton International, Ford and Chevrolet trucks for transportation to the preparation plant. Average daily output is 600 tons of raw coal per shift during the stripping season. Reject in preparation is 50%. Average men employed in stripping is 17, including six truck drivers and five men in the plant.

Will Defense Production Be Caught in the Squeeze?

When Congress revised and extended the Defense Production Act, it relaxed a squeeze on business profits.

President Truman asserted that this action by Congress cripples the government in its effort to prevent inflation which, as he puts it, could lead to "enrichment and profiteering for the few, economic hardship and misery for the many."

He asked Congress to rescind its action.

This editorial—the second on problems presented by "escalator" clauses—aims to throw some light on this conflict of opinion.

The Squeeze

The squeeze on profits was imposed in the name of price stabilization. The idea behind it was simple. The *selling prices* of industrial products were to be held under a tight lid. But many industrial costs are affected by "escalator" clauses of one kind or another which tend to boost production costs. Thus, with rising costs and fixed prices, profits would be squeezed and much of the cost of defense would thereby be shifted from those favored by escalator clauses to business concerns.

The mechanics of this squeeze on profits were complicated. But here, in brief, is how it was to work. The first step was to require manufacturers to set ceiling prices, effective May 28, for their products.

These ceiling or maximum prices were to allow for increases in manufacturers' costs that had occurred since Korea. *But they did not allow for all increases.* Manufacturers, for example, could not include increases in indirect costs—office or selling costs. Neither could they, in calculating their new prices, include increases in the costs of materials or direct labor that had come after March 15. This was the first phase of the squeeze on profits.

The second phase was prepared by *not* putting a ceiling on costs. The Wage Stabilization Board said it could not disturb the operation of "escalator" clauses by which wage rates are geared to the cost of living. Moreover, nothing could be done to curb the operation of the farmers' "escalator" clause, the farm parity arrangement. Under it, the federal government underwrites higher prices for farm products to match increases in the cost of things farmers buy. So this left wages and many materials costs free to rise against a ceiling imposed on the prices of what industry has to sell.

Relief—at a Loss

On two conditions only would the Office of Price Stabilization permit a company to raise its prices and escape this squeeze. One of these was that increased costs had more than wiped out its profits; in other words, that it was operating at a loss. The other condition was

that the industry of which the company is a part was not, as a whole, making "excess profits." That is, the industry, as a whole, could not get price relief if its overall profits before taxes were greater than 85 percent of its average profits during the best three of the four years from 1946 through 1949. Many companies expected that their profits would be cut drastically before they could get through this narrow escape hatch.

When this squeeze on profits was set up, we were told that industry as a whole was reporting record profits. But, it was equally true that wage rates and farm prices also were at record high levels. And it was also true that, under the impact of rising taxes and the dislocations caused by the defense mobilization program, profits actually were on the way down.

Profits—Going Down

By the time Congress acted to relax the squeeze, corporate profits, after taxes, were running at a rate 20 percent lower than they had been six months before. And the clear prospect was that they would continue to decline.

So the issue put up to Congress was simply this. Should business firms stand so much of the brunt of the defense costs while "escalator" clauses continued to exempt organized workers and farmers from paying their share of those costs?

But this question actually is much broader than one of fairness or unfairness alone. One certain effect of such a squeeze on profits would be to undercut the capacity of private industry to install the new plants and equipment needed for our mobilization effort. Today—unlike World War II—private industry is financing almost all of our huge program to expand production. And about two-thirds of the money that has been plowed into the expansion and improvement of our industrial machine since World War II has come out of profits.

In view of all this, Congress decided last summer to relax the pressure on profits. This was done by the controversial Capehart Amendment to the Defense Production Act. This amendment has serious administrative weaknesses. But some measure with the same purpose is needed to maintain profits at a high enough level to finance the huge and continuing expansion of our industrial machine that is now underway.

Basic Issues

As soon as the amendment was enacted, the President asked Congress to revise the law again. The heart of his proposal was to restore to the Administration the powers it used last spring to arrange the squeeze on profits outlined here.

This controversy will continue. There can be no final answer to it as long as we have the economic controls made necessary by mobilization.

But if we look beneath the surface of this technically complicated controversy, we shall see clearly that the basic issues are:

1. Whether we really shall make an effort to distribute fairly the burdens of inflation caused by our defense mobilization—
2. Whether farmers and organized workers should be exempted from these sacrifices by escalator clauses—at the expense of the nation as a whole—
3. Whether profits should be squeezed still more—at the risk of putting a fatal squeeze on the effort of industry to build new plants and install new tools. These new facilities are essential to maintaining American living standards—and they are the heart of our ability to defend ourselves and the rest of the free world.

Americans face no more important economic issues at this time.

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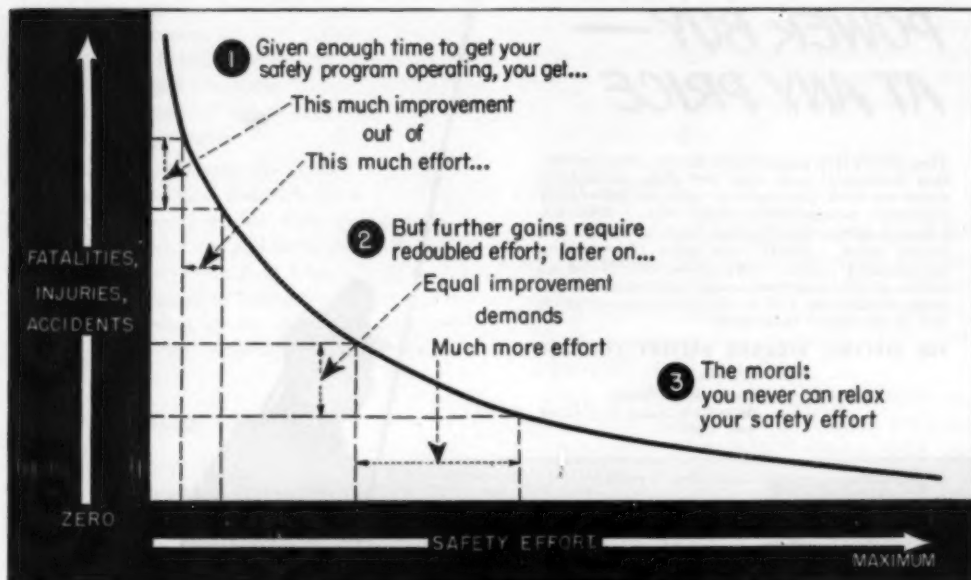
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Foremen's Forum



HERE'S THE PICTURE that shows how safety gains call for more effort to keep the trend regular.

When the Record Shows 0.0 Fatals per Million Tons, We've Reached . . .

The Irreducible Minimum

In the Heat of the Battle It's Always Wise to Keep the Final Objective in View . . .

In the Frontal Attack on Mine Accidents, Where Is the Goal? How and When Do We Get There?

THE IRREDUCIBLE MINIMUM, for purposes of this discussion, is defined as the point from which no further progress can be made. In conventional mathematics that point is zero. In mine safety, also, the only legitimate goal, slated for achievement sometime in the future, should be zero. In other words, the complete elimination of accidents is the proper target of safety promotion.

You say let's be practical? For a

change, let's not be practical! Let's not be practical to this extent: We shall refrain from discussing the ABC's of doing things the safe way while we spend a few minutes exploring the mental attitudes that should lie at the base of effective safety effort.

Our purpose in approaching this subject, therefore, is to identify the only mental attitude that could possibly lead toward making the defined

irreducible minimum an accomplished fact. That attitude requires a personal belief that the job can be done.

Thinking—Short and Long

In pointing out the shortcomings of fatalistic thinking and attitudes, the Reverend John W. Van Zanten, Roslyn, N. Y., in a recent Sunday sermon offered three illustrations, as follows:

1. Early in the 18th century, Thomas Malthus, a British political economist, stirred up a controversy by warning that the population of the earth was increasing at such a rate that it soon would be impossible to satisfy all the appetites on the globe. Mr. Malthus took a dim view of the future. But even at the time Malthus' views were being embraced by many men, other men were hard at work increasing the world's transport, col-

B.F. Goodrich



How mine owner gets double wear from BFG tires

THE Allegheny River Mining Company operates an underground coal mine at Cadogan, Pennsylvania. Located in the Lower Kittanning coal vein, the company runs 17 shuttle cars to transport and load coal after it is cut. All cars are now equipped 100% with B. F. Goodrich tires.

These BFG tires are subjected to unusually hard wear, as they travel constantly over coal, rocks and rough road beds. Although operating conditions are most difficult, BFG Universal tires are doing an excellent job at this mine. The tread is giving twice as much wear and longer service than other tires tested. No delays have been caused by

tire trouble. Unusually small maintenance and service have been required.

Reports from B. F. Goodrich users everywhere indicate top performance of BFG mine tires as compared with other brands. Specially compounded tread rubber resists cutting. More tires can be recapped because the patented B. F. Goodrich nylon shock shield gives extra bruise protection . . . through layers of strong, elastic nylon between the tread rubber and the cord body. This nylon shock shield is an exclusive B. F. Goodrich feature and is found on all BFG tires of 8 or more plies . . . at no additional cost to you!

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off-the-road tire for every need . . . including the new all-nylon tire for coal mines, construction projects, quarry work, strip mining, etc. See your dealer or write for additional information. The B. F. Goodrich Company, Akron, Ohio.



In a Safety Campaign, the Work Gets Harder as the Record Improves

onizing virgin territories and contributing to industrial and agricultural progress. In short, while one school of thought succumbed to pessimism, another was hard at work on the solution to the problem. The workers must have prevailed because we now have the means to produce enough food for everyone if only we could distribute it efficiently.

2. In the late Thirties many visitors to Berlin and Rome returned to us and spoke about as follows:

"We have seen the armed might and efficiency of the Axis nations and it is doubtful that we can stand against them. Therefore, since Fascism represents the wave of the future, let us float our boat upon it." Not long afterwards, in the early Forties to be exact, men with high regard for the sanctity of the individual, including some who formerly were awed by Axis "efficiency," proved that Fascism is not the wave of the future by kicking it into a heap. In fact, there is no such thing as an ominous wave of the future, unless we submit to pessimism, fatalism and a belief in the inevitability of a dark tomorrow.

3. Some years ago Oswald Spengler, an eminent historian, concluded that civilizations rise and fall in cycles, and the rhythm of their emergence and decline is irresistible. In our time, another eminent historian, Arnold Toynbee, disagrees. Mr. Toynbee contends that nations or civilizations collapse only when they fail to defend themselves against forces that threaten their existence. The forces may be external enemies or internal decay. In other words, civilizations die when they fail to respond to challenges. Men of spirit are inclined to buy Toynbee's version.

Wanted: Long Thinking

What has all this to do with mine safety? How can the optimistic attitudes of the foregoing illustrations be applied in the 13-ft distance between the last permanent support and the face? Or on the haulage road? What part does proper attitude play in achieving the irreducible minimum? Here it is! If we believe that mine

accidents are inevitable, the plague will always be with us. However, if we believe that mine accidents are not inevitable, then the way is open to continued improvement.

It boils down to this. Is the next accident that might occur in your mine inevitable, or can it be prevented? It is almost certain no one will admit the next accident is inevitable, but the only time you can prevent it is before it happens. The irreducible minimum can be achieved only when the "next" accident is forever postponed. Whether that happy condition will exist in our generation, we have no way of knowing.

That brings up the matter of setting higher-than-zero goals. We believe such interim goals are necessary to sustain safety enthusiasm, but they should be viewed as milestones rather than destinations.

The Safety Picture

The characteristic curve of safety performance, shown in the accompanying illustration, ties this piece together. Note the arrangement of the graph. The vertical axis is a measure of the number of fatalities, injuries and/or accidents per million man-hours of exposure, millions of tons, years or any other denominator you may choose. The horizontal axis is a measure of safety effort with intensity of effort increasing toward the right.

As the graph shows, where safety effort is entirely lacking the curve moves out of sight at the top of the chart, meaning the number of accidents is shockingly high. However, when maximum safety effort is applied the curve drops toward the horizontal axis, or zero.

Will you say it can't be forced to zero? You shouldn't, because that constitutes failure to respond to a challenge. In fact, the safety challenge calls for redoubled effort, because more work is required to achieve each successive increment of improvement as the overall safety of your mine increases.

Progress to Date

There is no place, short of zero, at which safety effort can be abandoned

with the explanation that further progress is not worth the time, toil and expense. There is no "point of diminishing returns" in safety. Even when the irreducible minimum is a reality, maximum safety pressure will have to be exerted continuously to prevent a relapse.

How far away is this irreducible minimum? For an answer to that question let's investigate the trends as indicated by recent experience. The 1950 Bituminous Coal Annual, published by the Bituminous Coal Institute, on p 157 reads as follows:

"The 1949 safety record shows that 0.4 lost-time injuries occurred for every one happening in 1930, in relation to every million tons produced. As to fatalities per million tons, 0.3 happened in 1949 for every one in 1930.

"Now consider accidents in relation to time exposed to physical hazards. The U. S. Bureau of Mines has furnished comparative rates for fatal and lost-time injuries for the years 1930 through 1949, with classified distinctions between underground and surface mining.

"The 1.91 men losing their lives in 1930 for every million man-hours (portal-to-portal basis) of working in deep mines had decreased 38% to the rate of 1.19 men per billion man-hours in 1948.

"As to lost-time 'non-fatal' injuries underground, these in 1930 were at the rate of 83.73 per million man-hours of exposure to physical hazards, whereas in 1948 they were at the rate of 58.38, a 30% improvement."

The Safety Challenge

Note the magnitude of the safety improvement over the last 20 yr. If similar gains continue throughout the next 20 yr the industry will be in a position to view the irreducible minimum as a reality, not a dream.

However, to be consistent with our thesis as presented in the illustration, we can expect the next 20 yr to challenge us to even greater safety effort because gains come harder as the record grows brighter.

Since we are searching for basic attitudes, let's consult the source of all good lessons in living—the Holy Bible. Genesis 1 carries the account of how the Creator placed Man in dominion over all the earth's creatures and growing things. The Lord's assignment of man to this position of dominance was as much a divine injunction as it was a gift because we are commanded to rule our environment.

Mining hazards are a condition of our environment which must be eliminated if we are to rule. To settle for any goal higher than zero is toleration of a bad condition, failure to respond to a challenge and violation of our divine injunction.

How Many of These Safety Questions Can You Answer?

Does accident-prevention training pay out? . . . What's the key to better haulage safety? . . . What new safety wrinkle will soon be tried in the anthracite region? . . . Can you control dust at the face?

These are just a few of the questions discussed and answered at the annual meeting of the Coal Mining Section of the National Safety Council, which you'll find digested for quick reading on p 136 of this issue. It's just one of the many special staff-written meeting reports *Coal Age* offers you during a year. Checking them for important industry trends and developments is worth your time.

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JENKINS FIG. 270-U

Solid Bronze Wedge

and FIG. 270-UN

Nickel Alloy Wedge

Traveling Spindle—Union Bonnet

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Fig. 270-UN, with a nickel alloy wedge, is recommended for exceptionally severe conditions of rapid wear and corrosion.

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Made in sizes from $\frac{1}{4}$ " to 2", Fig. 270-U or Fig. 270-UN will provide unequalled economy in any 200 lb. steam, 400 lb. O.W.G. service. Compare performance, especially where conditions are most destructive to valves, as in oil refineries, dye houses, chemical, rubber, and food plants. You'll find there are no other valves like them.

Whatever your need in Bronze Gates, you'll find the right valve for the service in Jenkins complete line. Thirty-five different patterns are available for steam pressures up to 300 lbs., O.W.G. pressures up to 600 lbs. All are built to Jenkins unvarying high standard which makes them the longest-lasting, lowest-upkeep valves that money can buy. Jenkins Bros., 100 Park Ave., New York 17. Jenkins Bros., Ltd., Montreal. Sold through leading Industrial Distributors.

WRITE FOR THIS FOLDER
Form 181-B describes the
Fig. 270-U and
other popular
Jenkins Bronze
Gates on, call
your Jenkins
Representative.



JENKINS
LOOK FOR THE DIAMOND MARK
VALVES



SOLID WEDGE
SCREW-IN BONNET
TRAVELING SPINDLE

SOLID WEDGE
SCREW-IN BONNET
STATIONARY SPINDLE

SPLIT WEDGE
UNION BONNET
TRAVELING SPINDLE

SPLIT WEDGE
SCREW-IN BONNET
TRAVELING SPINDLE

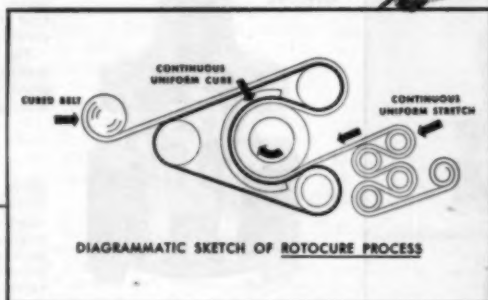
SOLID WEDGE
OUTSIDE SCREW & YOKE
RISING SPINDLE



**Too Bad they don't Stamp
OCS* in Red for
Warning...**

WITH **ROTOCURED** **BELTS You're Safe** **and You Know it!**

*Overcured Sections — present every 30' to 40' in all belts made by the flat press method. Only Rotocuring (continuous, non-stop curing) eliminates this major cause of belt failure.



When conventionally-made (flat press cured) conveyor belts fail on you early, don't blame the manufacturer or the supplier. Blame the process! These belts are made with *overcured* or *double-cured* segments of 2" to 4" width across the entire belt at 30' to 40' intervals. They can't be eliminated in flat press curing because they are inherent in this process of "stop and go" vulcanization. As each section is cured, it advances *less than a full press length*. Hence part of sections previously cured get a double treatment which weakens the structure.

In The BWH Rotocure Process, vulcanization is *continuous*. This eliminates overcuring and weakened segments. You get a better conveyor belt in 4 ways:

- 1 With no overcuring, flex life increases as much as 40%
- 2 Mechanical distortion at the press ends is eliminated
- 3 Stretch is constant, uniform
- 4 Covers are uniformly abrasion-resistant

These four structural advantages mean extra work hours per belt, savings per ton in what you convey and the lowest possible maintenance costs in time and dollars. Ask your BWH distributor, or write us direct.**

**You'll find the advantages of Rotocure in BWH transmissions belts also — plus operation at lower tensions which means longer belt life.

Another Quality Product of
BOSTON WOVEN HOSE & RUBBER COMPANY

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MACWHYTE WIRE ROPE

PREformed and Internally Lubricated

A THOUSAND AND ONE

to order from assures
the right rope for
your equipment

There is a Macwhyte Wire Rope that has been specially engineered and job-proved for any particular type of equipment you operate. That's why it pays to specify Macwhyte. Over the years, ropes for all types of equipment in every field have been developed by Macwhyte. Recommendations are promptly available either from Macwhyte distributors or Macwhyte Company, 2931 Fourteenth Avenue, Kenosha, Wisconsin.

Ask for these helpful bulletins:

"Wire Rope—So What?" (No. 5134)—Illustrated exclusive interview with veteran wire rope engineer who talks straight from the shoulder about saving hundreds of wire rope dollars.

"How to Order Wire Rope" (No. 5025)—Tells exactly what to consider. Also includes convenient table of sizes, constructions, strengths and weights of Improved Plow Steel Wire Ropes.



**MACWHYTE
COMPANY**
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MAC depots: New York • Pittsburgh • Chicago • Minneapolis • Fort Worth • Portland • Seattle • San Francisco
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1010

Operating Ideas

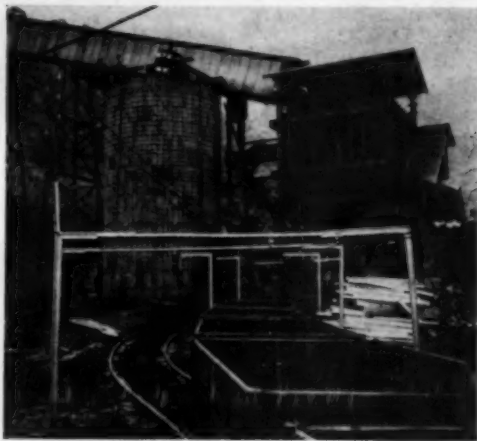
Concrete-Stave Storage Bin Reduces Mine Delays

A BOTTLENECK which caused mine delays at the Aflex (Ky.) operations of the Leckie Collieries Co. is a thing of the past since erection of a 200-ton concrete storage silo. No longer need the mine stop if something goes wrong at the preparation plant or the plant cannot take the coal because it must operate a bit longer on the other type of coal it washes and loads separately.

The silo, supplied by the Neff & Fry Co., Camden, Ohio, consists of special precast "Super-Concrete" interlocking staves bound with steel hoops and is 20 ft in diameter and 40 ft high. The storage space from which the coal gravitates through the car-loading chute is 30 ft deep.

Thacker mine served by the silo operates with belt haulage on the mainline, as described in the article beginning on p 86 of this issue. The belt system extends down the hill to a transfer point from which the coal is trammed 4,000 ft on an outside haul to the preparation plant. The original installation at the transfer point consisted of one loading track and a 50-ton wooden hooper. Another loading track was added and the silo erected alongside it.

Storage capacity between the mine portal and preparation plant now includes 75 7-ton drop-bottom mine cars, the concrete silo and the old bin, which together can store a half a day's production. The silo handles steam coal, while by-product coal is produced by the other mine delivering to the same plant. After hand-picking, both coals are crushed to 5 in and all the 5x0 is washed.



CONCRETE SILO quickly erected at a relatively low cost makes a permanent storage bin for cushioning mine output.

Track and Flat-Deck Cars Eliminate Need for Reversing Belts



MEN LIE CROSSWISE on these flat-deck man-trip cars, cushioned and insulated by mats made of discarded conveyor belting.

LONG EXPERIENCE with belt haulage in low-coal mines has convinced officials of the Leckie coal organization that it generally pays to install track for handling men and supplies and thus eliminate the necessity of reversing belts. To carry men and materials in the Thacker mine of the Leckie Collieries Co., Aflex, Ky., equipment consists of a trolley locomotive and two new flat-deck cars made by the Differential Steel Co. The deck top is 13 in above the rail and measures 8x18 ft. Eight-wheeled trucks are used.

Men lie crosswise on top of the deck, with each car accommodating up to 10 men. The two cars of the regular man-trip carry the whole shift. Mats made from discarded conveyor belting cushion the men on their ride and insulate them from uncomfortable temperatures of the deck.

Coal is mechanically loaded in the mine and only four rooms are worked. Transportation from the loading machines to the portal is a continuous operation, made possible by the use of Piggyback conveyors as described in the article beginning on p 86 of this issue.

Plan

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ACCURATE RECORDS**

LENGTHEN BATTERY SERVICE!

This timely plan puts at your disposal a complete system of manuals, articles, specifications, bulletins, charts, graphs and forms explaining and illustrating how to select, charge and handle, maintain and determine the condition of your batteries. This material, which can increase battery service as much as 50%, is FREE to battery users, without obligation. A request on your letterhead will bring descriptive booklet by return mail.



DAILY RECORD SYSTEM CONTROLS BATTERY MAINTENANCE

date and amount of water are recorded.

Such a record tells 1) whether batteries are fully charged when placed in service; 2) number of hours each battery was in service; 3) if batteries were discharged below normal value; 4) whether batteries are being properly charged; 5) when batteries should be changed to prevent overworking and resultant failure during shift.

**The GOULD "Thirty"
with "Z" PLATES—
America's Finest
Mining Battery**

[illegible]

GOULD

STORAGE BATTERIES

GOULD-NATIONAL BATTERIES, INC., TRENTON 7, NEW JERSEY

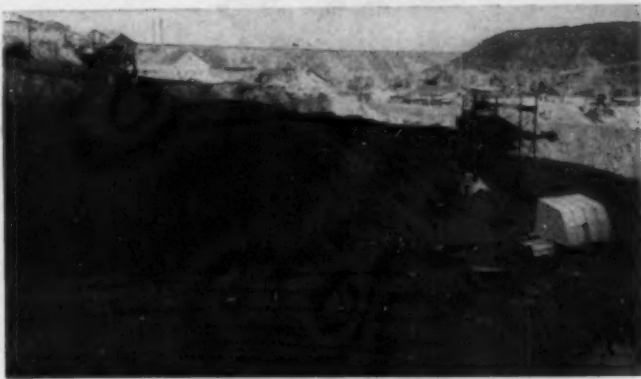
Always Use Gould-National Automobile and Truck Batteries

Bulldozer Loads Cars From Stockpile

BY SUBSTITUTING a ramp and bulldozer for conventional equipment, fast economical loading of screenings from the stockpile is achieved at the Kenilworth (Utah) mine of the Independent Coal & Coke Co. The ramp is wide enough to permit loading a railroad car from end to end without moving.

The screenings stockpile site is a canyon near the tipple. A conveyor delivers screenings to a scraper pick-up point at one side, from which they are distributed by the scraper bucket. The scraper hoist is mounted in a housing on a rail truck so that it can move back and forth for piling in fan-fashion.

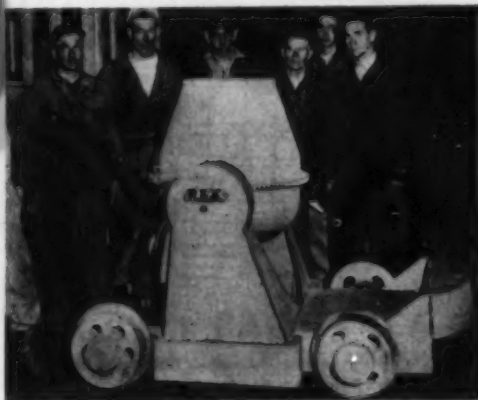
In loading, a bulldozer runs up on top of the pile and pushes the coal to the ramp and over the lip into the car. In less than a dozen trips, the car is filled.



PIILING EQUIPMENT includes a conveyor from the tipple and a scraper with curved track for distribution of the screenings.



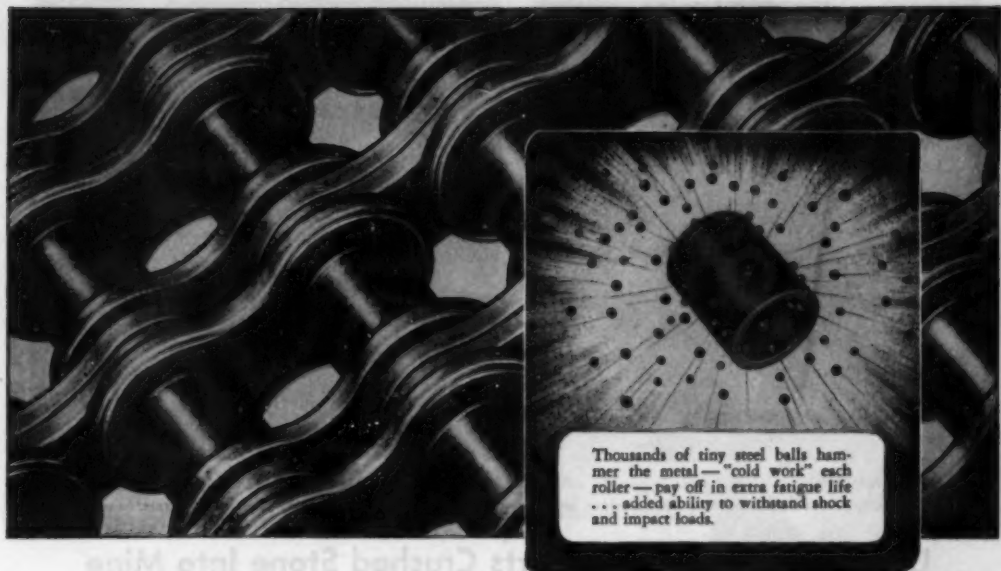
LOADING EQUIPMENT includes a wood ramp (left) at the right height above the tracks, to which the coal (right) is pushed by a bulldozer. Less than a dozen trips will fill a car.



Mine-Cars Wheels Take Concrete Mixer Underground

THIS CONCRETE MIXER adapted for underground use is proving a versatile tool for construction of airways, patchwork and general mortar and cement mixing at Mine No. 9 of the Jamison Coal & Coke Co., Farmington, W. Va. The "Train Mixer," using a Rex 3½S tilter mixer made by the Chain, Belt Co., was created by the West Virginia Mine Supply Co., of Farmington, a Rex distributor, in collaboration with the mining company.

The Rex 3½S unit was relieved of its portable axle mounting and placed on a truck made of 44-in-gage mine-car wheels. A 1½-hp 250-v DC Century motor powers the mixer and the whole unit is moved about the mine by connecting it to a mine locomotive. Because of its simplicity and portability, the unit has been found to be an effective time and money saver in speeding necessary mine work underground.



Thousands of tiny steel balls hammer the metal—"cold work" each roller—pay off in extra fatigue life . . . added ability to withstand shock and impact loads.

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... one of the extra-strength features you get with every LINK-BELT Roller Chain

Look for the distinguishing darkened rollers on every roller chain you buy! They're your guarantee of extra fatigue life.

Shot-peening is just one of the added manufacturing refinements that make Link-Belt Precision Steel Roller Chain a longer-life chain. Controlled material selection and heat treating assure absolute uniformity . . . no weak members.

Link-Belt Roller Chain is available in single or multiple widths, in $\frac{3}{8}$ to 3 in. single and double pitch. For the best in roller chain, get in touch with your nearest Link-Belt office.

**Easier coupling and uncoupling
without sacrificing
load distribution**



Patented E-Z Assembly feature of Link-Belt Precision Steel Roller Chain has won world-wide approval. Coupling and uncoupling of multiple width chains—right on the job—is far easier. There's absolutely no sacrifice of load distribution . . . no loss of the chain's remarkable performance. Press-fits between chain pins and middle bars have been modified. But full load-carrying capacity across the entire width of the chain has been maintained.

LINK-BELT
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LINK-BELT COMPANY: Indianapolis 6, Chicago 9, Philadelphia 40, Atlanta, Houston 1, Minneapolis 5, San Francisco 24, Los Angeles 33, Seattle 4, Toronto 8, Springs (South Africa). Offices, Factory Branch Stores and Distributors in principal cities.



MECHANIZED HANDLING of crushed stone is possible with use of an 8-in borehole at the Bell & Zoller Oriole mine. An undercut gate (left) at the bottom of borehole controls flow of stone into a conveyor-bottom mine car (right) built to eliminate hand-spreading.

Unused Borehole Transports Crushed Stone Into Mine

TAKING ADVANTAGE of a previously-used 8-in steel-cased borehole has resulted in an effective and unusual method of transferring crushed stone from dump trucks on the surface to a mine car 130 ft below at the Oriole mine of the Bell & Zoller Coal & Mining Co., Madisonville, Hopkins County, Ky., reports C. Ward Padgett, general superintendent of the company's West Kentucky Div.

To receive the stone, a 10-ft-square concrete hopper, with sides sloping at

45 deg, was built around the 8-in casing, with the top of the hopper set level with the surface so that the stone could be pushed into it by a bulldozer. The 8-in casing was cut away, leaving a smooth channel into the borehole. Flow of stone into the mine car is controlled by an "undercut gate" attached to the bottom of the casing inside the mine. The stone is drawn into the mine until the surface supply within the angle of flow is depleted. A phone call to the sur-

face then results in the bulldozer pushing more stone into the hopper.

Since even with this obviously economical method there was still much handwork required inside the mine, an electrically driven conveyor-bottom mine car was built in the mine shop to expedite spreading of the stone on the motor road. With the conveyor's motor leads connected to the locomotive's power line, the conveyor-bottom car is pulled slowly along the track to spread the stone.

If Hot-Ash or Steam Lines Endanger Men, Try This



IF LOCATION OF PIPELINES carrying steam or hot ashes creates the hazard of accidental burns at your operation, an insulating job like this at a large utility power plant might be well worth your trouble. To protect workers using the handrail only a few inches from a vertical pipe carrying 350-deg F ash, the 8-in line was covered with 1½-in-thick molded-type insulation and a ½-in layer of mineral-wool cement up to about 6 ft above the floor level. The job was finished off by covering the mineral-wool with a single layer of asphalt paper and 10-oz canvas which was glue-sized and painted. Thermal insulation is similarly applied in many plants, of course, where reduction of heat loss, as well as safety protection, is a factor.

After You Put a Good Idea to Work . . .

WHY NOT LET COAL AGE tell others about it and help you get a little "credit" beyond your own company? It takes only a couple of minutes to write COAL AGE about the good operating idea, "gadget" or "kink" you've successfully put to work. And remember, we'll gladly pay you \$5 or more for each acceptable "idea," on publication. Address: The Editor, COAL AGE, 330 West 42nd St., New York 18, N. Y.

For Rapid, Secure Roof Bolting, Use O-B Shells and Plugs

HAULAGE WAYS *Jr.*

● O-B Roof Support Expansion Shells and Plugs provide an easy way for rapid and secure roof bolting. If you are bolting to keep your roof in tip-top shape, you'll appreciate the speed and strength which O-B Shells and Plugs give to your bolt installations. See how easy it is to do a good job—swiftly!

1. The shell and plug are assembled into an easy-to-handle unit at the factory. All you do is to turn the plug onto the bolt, as shown in this first illustration.
2. Then separate the shell from the plug, and let the shell rest on its support, which may be a Palmut or upset ears pressed in the bolt. Be sure to keep the overlap between shell and plug within $\frac{1}{4}$ to $\frac{1}{2}$ of an inch.

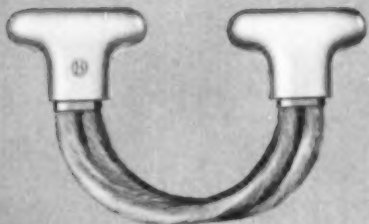
That's all there is to preparing a roof bolt for use when you use O-B Roof Support Expansion Shells and Plugs. Properly installed in right-size holes, these shells and plugs can develop the full tensile strength of the bolt. Get more information about them from your O-B representative or write to Ohio Brass Company.



Ohio Brass
MANSFIELD  OHIO, U. S. A.

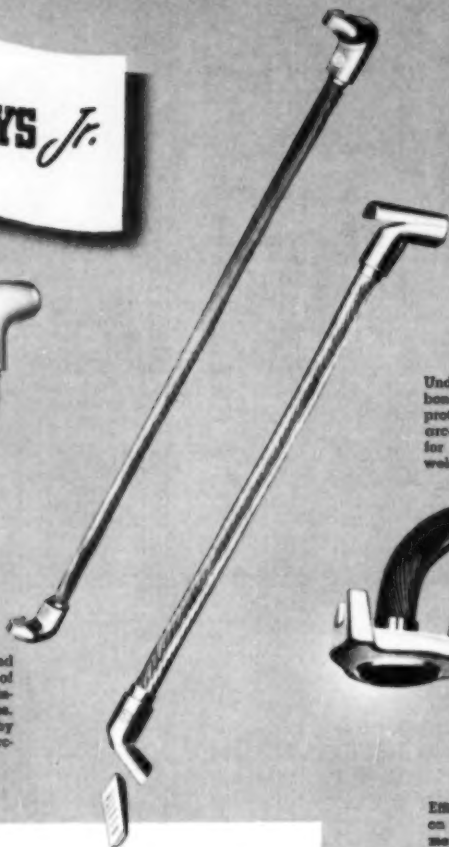
CANADIAN OHIO BRASS CO., LTD., NIAGARA FALLS, ONT.

HAULAGE WAYS *Jr.*



For use on 70 pound or heavier rail, AW-8 Rail Bonds are applied to the rail head by steel arc-welding. The terminal design reduces possibility of injury from car wheels.

The AW-20 is a typical long bond used to span joint plates. It is one of four O-B bonds for this purpose installed by the steel arc-weld process. Other joint plate bonds offered by O-B are mechanically applied or arc-welded with copper alloy.



For use in joint and cross bonding, the Wedge-Type Bond is easy to handle and install. The terminal is mechanically applied.

Under the rail head these AW-18 bonds are out of the way and well protected. AW-18's are installed by arc-welding with steel rod; AW-18's for the same application are arc-welded with copper alloy.

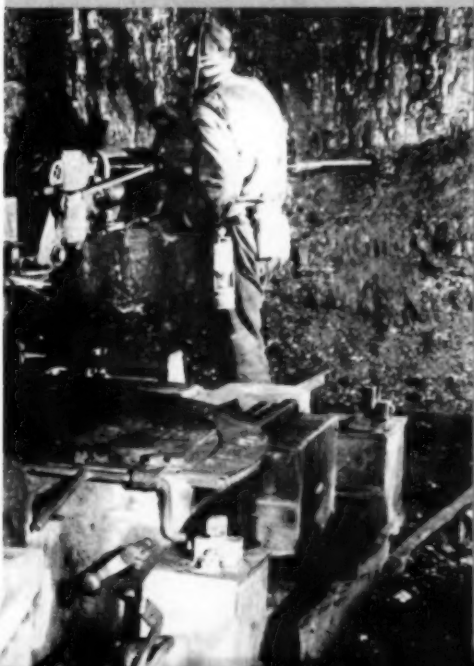


Efficient work at the face depends on a good power supply. Keep your men and machines producing, by guaranteeing that supply with a well-bonded return circuit.

Good Power Depends on Good Bonding

Keeping your rail return circuit bonded to capacity helps to hold voltage drop at a reasonable minimum, and gives you the assurance of a good power supply when and where you need it. To help you keep this return circuit bonded adequately, O-B offers durable, dependable rail bonds for any mine rail requirement. Some O-B bonds are designed for installation by arc welding or gas welding. Others are installed mechanically. With your choice of attachment method—and with a wide selection of styles for every bonding purpose, you have a complete line of tested, proved rail bonds for use in your haulage system.

Good power through good bonding keeps your face machinery at top efficiency, and thus increases each worker's tonnage output. Maintain a good supply of power in your mine with dependable O-B Rail Bonds!





Sometimes it is more convenient to use the O-B Mine Feeder Safety Switch, installing it against a wall or wood panel. This provides a secure mount, and puts the switch within easy reach.



The O-B Type-R Feeder Switch frequently is hung from the roof, where it is easily held with standard O-B hangers, insulators and expansion bolts, used singly or in any number of combinations.

USE *O-B Switches for Safe* SECTIONALIZING

● In a power distribution system circuit which must occasionally be broken under load, it is important that the switches can be used without danger to the operator or to the switch itself. Such is the case in a sectionalized underground trolley and feeder circuit, where uncontrolled power arcs from switch operation would create fire and safety hazards.

O-B switches for sectionalizing trolley and feeder circuits answer mine requirements for safety and fire control with heavy, quick-operating make-and-break mechanisms, and with powerful magnetic blowout coils. Contacts are positive and definite, and have full openings. The blowout coils quench power arcs quickly, preventing pitting and burning of switch blades and jaws, and safely diverting

them from the operator. Even when unusually heavy loads need be interrupted, the operator is protected by the blowout mechanism.

Safety underground depends largely on the materials and equipment in use. That's why it's wise to use tested, proved-safe O-B switches throughout your distribution system.

Ohio Brass

MANSFIELD

OHIO, U. S. A.

CANADIAN OHIO BRASS CO., LTD., NIAGARA FALLS, ONT.

Slack-Free Couplers Speed Rotary Dumping

HAULAGE WAYS *Jr.*

● Slack-free, rotating O-B couplers do much to speed loaded trips through the dump, and thus speed the entire haulage operation. When, for example, a trip is pushed through the dump, it is possible for the motorman to spot each car accurately without time-wasting guidance from the dump operator. He can do this since there is no slack movement in a trip equipped with O-B couplers, and by stopping his motor at stations marked along the track, he positions each car properly on the platform of the dump. The rotating coupler, of course, saves time too, by permitting each car to be emptied without being detached from the trip.

O-B Automatic Mine Car Couplers save time all along the haulage way, and promote safe operation at the same time. Speed with safety is a double feature worthy of your consideration!

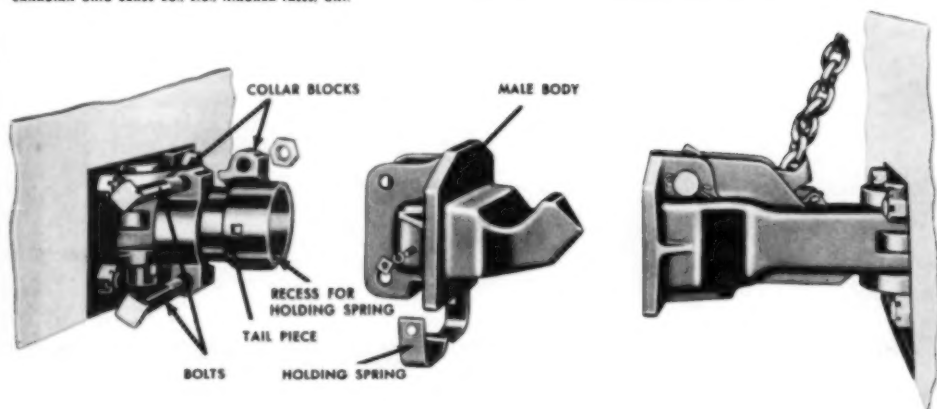
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How to Evaluate Performance of Fine-Coal Plants Graphically

Simple Chart Permits Quick Solution of Four-Variable Material-Balance Equation —Personal Errors Reduced

By MURRAY G. BOOBAR, Research Assistant, Div. of Fuel Technology, Pennsylvania State College

ROUTINE CALCULATIONS of product recovery by ash or size balances are continually made by the operators of fine-coal cleaning plants. These calculations involve the solution of some form of the general material balance equation:

$$X_F F = X_P P + X_R R \quad (1)$$

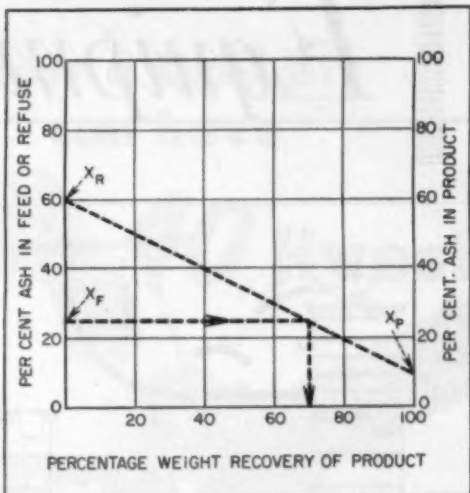
where F , P and R are the weights of feed, product and refuse, respectively, and X is the concentration of a particular component in the stream to which the subscript refers.

A nomograph of the type developed by Luckenbill and Diehl for the solution of distillation problems (*Chemical and Metallurgical Engineering*, Vol. 52, No. 9, p 124, 1945) can be applied to evaluate coal cleaning.

The alignment chart illustrates how a typical cleaning problem, based on the ash-balance method, may be solved. For example, assume that 100 lb of raw coal, F , of 25% ash content, X_F , enters a cleaning plant. The product contains 10% ash, X_P , and the refuse contains 60% ash X_R . X_F and X_P are connected by a straight line on the chart. A horizontal line is drawn from X_P until it intersects this line, and then is projected vertically downward to the abscissa, where the weight percent recovery is read as 70%, or 70 lb of coal per 100 lb of feed are recovered.

If the weight percent recovery and the ash contents of feed and product are known, and it is desired to find the ash content of the refuse, the procedure is as follows:

A point is marked where X_F , projected horizontally, intersects the vertical projection of the weight percent recovery. Then a straight line connecting this point with X_P and extended to the left ordinate axis indicates X_R on that axis.

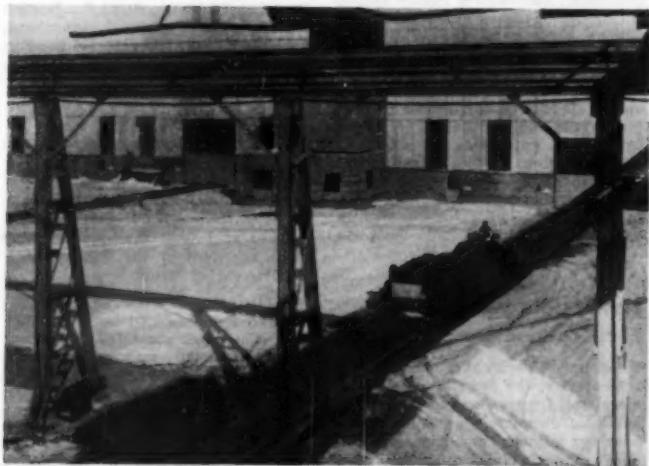


ASH-BALANCE NOMOGRAPH requires use of only a straightedge.

Nomographs of this type are readily adaptable to the solution of material balances based on the carbon-balance method. It also is applicable in determining the distribution of any number of components in a size balance. Its use is quick and simple and reduces the chances of making personal errors which might arise in attempting to solve the equation.

Any one of the four variables in Equation (1) can be determined with equal ease, provided the other three are known. The chart is limited by the fact that the number of entering and exit streams can total no more than three.

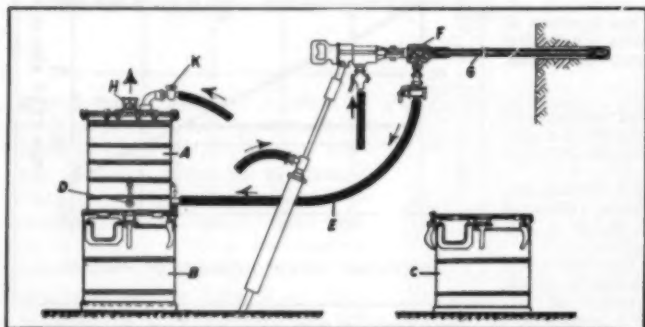
Here's a Way to Keep Snow off Your Ramps and Working Areas



IF A SNOWSTORM means the necessary but time-consuming chore of clearing snow from loading ramps, walkways, warehouses or other much-traveled areas, consider installation of heating cable in the concrete as was done at the Milwaukee plant of the Bucyrus-Erie Co. shown here. Just before the worst part of the winter last year, four concrete runways ranging from 100 to 275 ft long and about 10 ft wide were lined with some 40,000 ft of General Electric flexible lead-covered heating cable.

The best test to date came after a weekend snowstorm when, even with temperatures of 11 deg below, the cable was able to clear the runways in a few hours. The heating cable was laid on wire mats about 2½ to 3 in below the surface on approximately 3-in centers. Tile drains along the edges of the runways drain off the melted snow. Special step-down transformers were built to supply correct voltage for the non-standard lengths of heating cable. The required secondary voltage is about 180 v for the shortest runway and about 500 v for the longest.

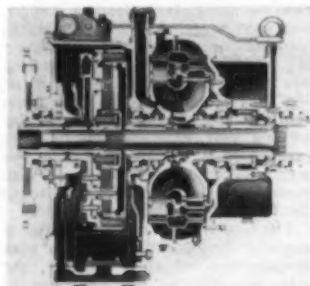
Equipment News



Foreign-Made Dust Collector Now Available (1)

The Konigsborn Exhauster, newly available in the U. S. and currently reported under test in American coal mines, operates on compressed air to collect and store dust and cuttings released in any type of percussion dry drilling, it is said. In operation, compressed air is fed through the valve (K, above) into the injector (A), which produces a strong vacuum that draws the dust-laden air from the drill hole through the bit holes, the hollow drill steel (G), the adapter (F) and the suction hose (E) into the

filter (A). After filtering, the air is evacuated with the spent compressed air through the exhaust port (H) while the dust settles in the storage tank (B) which will hold dust from 10 2-in holes 9 ft deep. The spare tank (C) is substituted when the storage tank is filled or may not be needed if paper disposal bags are used inside the tank. Two drills may be operated on one unit, which is available in three models. Full details may be had from the manufacturer's U. S. agent, Columbia Technical Corp., New York 22.



New Truck Transmission Cuts 99% of Shifting (2)

Development of a 3-stage hydraulic torque-converter truck transmission which is said to eliminate 99% of forward-gear shifting on the toughest grades and, when combined with engine drag, can perform 90% of the braking, has been announced following extensive field tests on the Mesabi

Iron Range. The new Twin Disc Model DF Direct Drive Hydraulic Torque Converter, used with a closely spaced transmission, makes a mine truck as automatic as a passenger car and provides the smoothest and most efficient use of power yet developed for trucks hauling loads up to 30 tons on grades up to 13%, the tests indicated according to the company. Hauling cycles were significantly reduced, with substantial savings on axles, tires, gears and brakes indicated. Performance and operating data on the two sizes available are thoroughly covered in Bulletin 162 available from the Twin Disc Clutch Co., Racine, Wis.

New Bogie-Wheel Unit for Crawler Tractors (3)

Designed for longer, maintenance-free service, the new Sterling bogie-wheel unit for crawler-type tractors is available completely assembled, with bearings adjusted and lubricated and does not require lubrication until after

EQUIPMENT BULLETINS

Available for the Asking Via the Postage-Free Card You'll Find Facing p 124

(4) AN ENGINEERING DRAWING of a typical air-controlled all-steel car-retarder installation is a feature of Bulletin 351 offered by McNally-Pittsburg Mfg. Corp., Pittsburg, Kan. It also gives a thorough operating description of the complete Bulldog Car retarder and discusses its eight major features.

(5) COAL - LOADING BUCKET—New bulletin on the Mamco coal dipper, available in capacities up to 7 cu yd, outlines the design and construction features of the unit that are said to permit larger-capacity and faster loading of cleaner coal. Offered by Maximom Machine Co., Altoona, Pa.

(6) MOTOR CONTROLS covered in the new "Controlog," an 88-p illustrated "Digest of Motor Controls," include the complete line of Clark AC and DC motor starters, motor-control centers, contactors, relays and other accessories. Provided are open and closed views, general descriptions, applications, enclosures, outline dimensions, and list prices, arranged for user convenience and speed. Available from the Clark Controller Co., Cleveland 10.

(7) ELECTRONIC SCALE—Design and operation of the newly announced Ametron electronic scale, said to offer greater speed, accuracy and installation versatility, are discussed in a new bulletin now available from the Streeter-Amet Co., Chicago 13.

(8) TAMPING PLUG—Bulletin from Quick-Seal Products, Inc., Herndon, Pa., outlines the features of the Quick-Seal tamping plug, which is said to offer safer and faster shooting, with reduced explosives consumption, and to be approved by the Pennsylvania Department of Mines.

(9) TRUCK - MOUNTED SNOW PLOWS manufactured by The Baker Mfg. Co., Springfield, Ill., described in Bulletin 1003, include the Baker V-type, reversible tripping-blade and one-way tripping-blade plows in a range of sizes for trucks of 1½ to 5 tons and up. Mountings, operation and features are discussed.

Material on Mining Bits



Proper instructions, vitally important to the correct use of carbide tools are available on mining machine bits, coal auger bits, strip bits, and

rock bits. They are thorough, time-tested, and reliable. Write Kennametal Inc., Latrobe, Pa., pioneers and world's largest manufacturers of cemented carbide mining tools.

A complete tool catalog is also available that gives specifications, prices, and performance data on Kennametal Mining Tools. Specify M-6. Any of the above material will be sent to you on request.

New Bit Rotary Drills Bolt Holes in Laminated Sandstone

**Drills hundreds of
feet in hard roof**



To give the greatest wear resistance in drilling hard roof, the Kennametal HFD Bit is tipped with a thick insert of Kennametal cemented carbide.

The bit fits into regular Kennametal Roof Bolting Rods. It is powered by ordinary electric drills. Material drilled with the bit is slate, shale, and laminated sandstone. The four main features of the bit are: (1) Smoother hole without rifling, (2) Longer gauge life in hard roof, (3) Easy bit sharpening, (4) Lower bit cost than obtainable with any other bit used for drilling medium hard mine roof. Sizes are 1 1/4-inch to 2 1/4-inch, prices range between \$4.85 and \$14.80, depending upon size and quantity.

Machine Bits Bore Rock



Six regular mining machine bits act as cutting teeth in this rigidly constructed bit used for rock boring. The "teeth" are set in

a heavy cast steel head. They are secured by set screws which allow them to be removed for sharpening when dulled. Drilling speeds are 3' to 3 1/2' per minute in average drilling. Feature: Ability to drill hard rock formations. Style is UD 6 1/2". The price, including bits, is \$45.10 to \$59.40 depending upon quantity. (ADVERTISEMENT)

**How a Drill Bit
can have
40 lives!**

**4,000 feet
in ordinary drilling
40 regrinds**

Two things make it possible for a bit to achieve a fortieth life. One is its high quality Kennametal tungsten carbide cutting edge and another is the kind of maintenance that is given to it. Poor or improper maintenance is, in most instances, the reason for early fatality. Is your Kennametal Bit changed when it gets dull? Is it reground according to recommended sharpening methods? If not, then a forty-life bit is improbable, and cost sacrifices are made in terms of lower drilling speed, higher drill maintenance cost, higher bit cost.

Under average drilling conditions, where the drilling is largely done in coal with only minor quantities of impurities, the Kennametal Drill Bit can, if properly cared for, give 4,000 feet or more of service or a hundred or more feet of drilling per sharpening. If your performance is less, it may be advisable either to look carefully yourself to be sure the right precautions are being used or better, ask your Kennametal representative to give you procedures a once-over. He knows from daily experience the ways in which bit service can be improved. The way to get maximum life, 40 lives if you're in average coal, is to remove the bit when dull, sharpen it as per the instructions that are prescribed by your Kennametal representative. Kennametal Inc., Latrobe, Pa.

*Names and addresses of Kennametal representatives
appear in your 1951 McGraw-Hill Mining Catalog.*

GRINDING INSTRUCTIONS



For the best service life on your tungsten carbide mining tools, they should be reconditioned at regular intervals and according to proper procedures. Conserve bit life by following proper grinding techniques. Write today for a copy of our complete, fully-illustrated folder on proper bit maintenance.

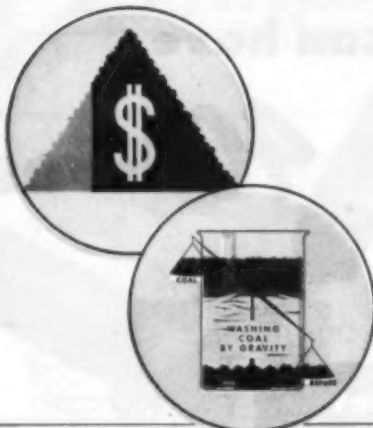
KENNAMETAL®



DRILL BITS • MACHINE BITS • ROCK BITS • ROOF BITS

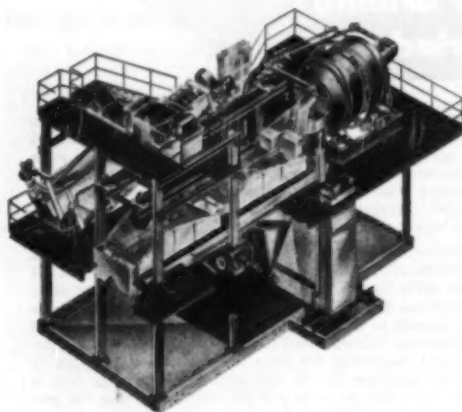
Bits for Every Cutting & Drilling Need

CONTROLLED CLEANING produces COAL PROFITS



Profitable coal cleaning in today's market requires control of washing operations with low cost, efficient methods.

The newest, most efficient coal cleaning method for most operations is Heavy-Media Separation with WEMCO MOBIL-MILLS.



You have a choice of three types of Mobil-Mills in selecting a washing plant to fit your particular requirements:

- 1 DRUM TYPE MOBIL-MILL** for accurately controlled washing of a full range of sizes from 8" to $\frac{1}{4}$ " with capacities up to 420 TPH.
- 2 DOUBLE DRUM TYPE MOBIL-MILL** for efficient cleaning of coal having complicated middling and washing characteristics. Produces a high quality float coal, a carefully controlled float middling and a reject. Capacities dependent on individual problem.
- 3 CONE TYPE MOBIL-MILL** for efficient, large volume production of fine coal in sizes 4" to $\frac{1}{2}$ ", with capacities up to 420 TPH.

Prime advantages of WEMCO MOBIL-MILLS for coal cleaning are:

Efficiency of cleaning
Accurate control of operations
Low investment per TPH of washed coal
Low operating and maintenance costs

Call a WEMCO engineer today for complete information on WEMCO test facilities to solve your coal cleaning problems, or write for descriptive bulletin.

OTHER WEMCO PRODUCTS

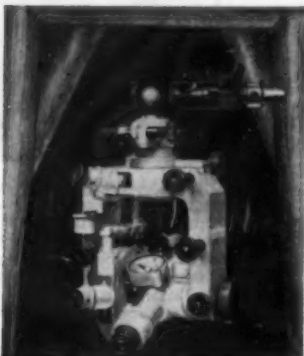
Mobil-Mills • Coal Spirals • HMS Thickeners
HMS Pumps • Densifiers • Cone Separators
Drum Separators • Fagergren Laboratory Units
Fagergren & Steffensen Flotation Machines
Hydroseparators • HMS Laboratory Units
Dewatering Spirals • Agitators • S-H Classifiers
Thickeners • Sand Pumps • Conditioners

WEMCO

WESTERN MINING COMPANY
740 748 FOLSOM STREET, SAN FRANCISCO 7, CALIFORNIA



1,500 hr of continuous operation, the maker says. The units are fully equipped with Timken bearings, and feature positive seals to exclude foreign matter and permanent locking devices to assure perfect bearing adjustment at all times. Since Sterling rollers operate independently of one another, less friction on the crawlers results, it is said. Full data from Sterling Casting Co., East St. Louis, Ill.



Suspension Transit Eliminates Tripod (10)

New Breithaupt suspension transit for underground surveying where space limitations make use of tripods impossible is said to be particularly useful in narrow openings, thin or inclined seams. The transit and signals are suspended by steel punches driven into rock or timber and where space is no problem, the transit can be used on a standard tripod. Horizontal and vertical circles 2% in diameter have a reading accuracy of 1 min and the telescope has a 30-mm aperture and 25-power magnification, it is said. The transit is fully enclosed and dust-proof. Full details from the maker's U. S. representative, Columbia Technical Corp., New York 22.

Self-Priming Pump in Various Sizes (11)

New Ingersoll-Rand line of self-priming Motorpumps is designed for pumping applications under section lift where the presence of air or vapor makes it impractical to use conventional centrifugal pumps. Self-prim-



ing of the Motorpump is accomplished by recirculating liquid trapped in the casing. During normal pump operation there are no recirculation losses and thus no need of valves to cut off recirculation. No flap valve is used because the pump casing is so proportioned that sufficient liquid is trapped on shut down to insure priming when the unit is restarted. The pump is built in sizes from 1/4 to 25 hp, with capacities up to 800 gpm and heads up to 180 ft. Standard models utilize cast-iron casings with bronze impeller. Bulletin 7240 with full details is offered by Ingersoll-Rand Co., New York 4.

New-Type Control for Varying Motor Speed (12)

Designed to offer precise control of speed with no maintenance problems, the new E-M Regutron magnetic amplifier control is used with the E-M adjustable-speed magnetic drive, an electromagnetic torque transmitting device which gives variable speed output when used in combination with a constant-speed motor. The simplified magnetic amplifier control eliminates all the complicated electronic circuits of the previous electronic-type amplifiers, and the conservatively rated parts should provide long service with little change in characteristics, the company says. E-M adjustable-speed magnetic drives are built in ratings of 25 hp and up for such applications as fans, centrifugal pumps and centrifugal compressors. Details from Electric Machinery Mfg. Co., Minneapolis 18.

Excavator Extends Digging Depth (13)

A newly designed hoe attachment for the Koehring 304 1/2-yd excavator will increase the machine's digging depth to 19 ft 9 in, according to the manufacturer. Other improvements recently made on the Model 304 provide extra resistance to side sway and extra strength to meet any operating condition for below-ground-level excavating, it is said. Another feature cited is a versatile dipper arrangement that provides top production capacity under any working condition by utilizing adjusting links on the



dipper arm that permit three variable settings of the dipper angle to match the type of material and cut. Full data from the Koehring Co., Milwaukee 16.



Metal-Spraying Guns Offer Higher Speed (14)

Two new metalizing guns, the Metco Type 4E for machine element work and the Type 5E for corrosion-protection coatings, are said to develop the highest spraying speeds yet available in guns designed for hand-held operation, and provide almost automatic operation and uniform coatings at lower cost than previously possible. Both weighing only 4 lb 12 oz, the Metco Type 4E gun is designed to spray wires to 1/4 in in any metal at speeds up to 40% faster than previous models, while the Type 5E is said to be the first gun specifically designed for high-speed spraying of the softer metals, such as zinc and aluminum, for corrosion protection. Bulletin 94 and 95 offering full data are available from the Metallizing Engineering Co. Inc., Long Island City 1, N. Y.

For More Information . . .

On these and other products or bulletins described in this section, take advantage of the postage-free card facing p 124.

Not nearly so tough

with a
**TWIN DISC TORQUE
CONVERTER**

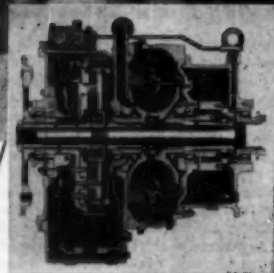
Have you heard what Bagdad Copper Corporation is reporting on its Buda-powered Dart Trucks in which the power is put to work through the new Twin Disc DF Hydraulic Torque Converters?

"The trucks negotiate the steep grades fully loaded and without ever shifting gears . . ."

"They return down grade without using the brakes . . ."

"Total maintenance and repair costs may be less than 2 cents per ton...far less maintenance than ever before . . ."

"Fuel costs per ton of ore hauled with



the torque converter have decreased instead of increasing as was presumed."

The Twin Disc Model DF is a three-stage hydraulic torque converter with built-in converter braking feature which not only eliminates gearshift guesswork on grades but also, combined with engine drag, can perform 90% or more of the braking. The records the DF is setting are amazing. Write today for details. You may be able to save hundreds of dollars per unit in maintenance savings and faster round trips.



TWIN DISC CLUTCH COMPANY, Racine, Wisconsin • HYDRAULIC DIVISION, Rockford, Illinois

BRANCHES: CLEVELAND • DALLAS • DETROIT • LOS ANGELES • NEWARK • NEW ORLEANS • SEATTLE • PHOENIX

Equipment Shorts You'll Want to Check

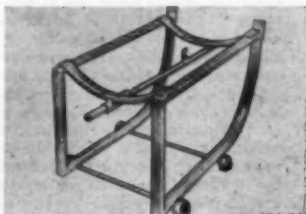
(15) DIESEL MUSIC MUFFLED—

The sound of a 225-hp tractor engine may be music to the ears of the owner, but sometimes he needs to turn the music down. That's why Caterpillar recently offered a complete muffler group for the new DW20 and DW21 diesel tractors, similar to that offered for the smaller D4V10. The new attachment will reduce engine exhaust noise, providing greater operator comfort and reducing annoyance for people living near job sites, the company says.—Caterpillar Tractor Co., Peoria 8, Ill.



(16) FOR SEALING OFF LEAKS

and water seepage in concrete walls, newly improved "Flexcite" is said by the maker to provide quicker action and more thorough bonding. A liquid chemical mixed with cement or cement and sand, Flexcite produces an easily handled fast-setting mortar that may be forced into an opening—even against hydrostatic pressure—to seal off severe, fast-flowing leaks, it is said, and also is recommended for plaster-coating walls above or below ground or water level. Literature and trial-order plan from Flexrock Co., Philadelphia 4.



(17) BARREL AND DRUM CRADLE

featuring a "loading bar" that permits loading of drums with greater safety, the all-steel Model GS CW-H is said by the maker to be light in weight yet strong enough for heavy loads. Designed for the storing and draining of drums and barrels, the wheeled unit costs \$19.50. Details or trial order from General Scientific Equipment Co., Philadelphia 32.

(18) PLASTIC BLOWERS now being

BELT TAKES BEATING... WEAR TAKES HOLIDAY

QUAKER CONVEYOR BELTING



GET THIS NEW QUAKER CATALOG

All of the facts and data you need when ordering industrial rubber products. Quaker Rubber Products will give you longer wear and lower maintenance. Get your copy today . . . no charge or obligation.

Stands Torture Run . . . No Noticeable Wear or Tear

Ton after ton of sharp jagged coal and slate drops ten feet on to the 2500 foot main line Quaker Conveyor Belt at Carbon Fuel Corporation's West Virginia mine. The impact is terrific . . . enough to tear an ordinary belt into pieces. This Quaker Conveyor Belt has withstood this constant torture without noticeable wear, tear or failure and is still in use.

Quaker Conveyor Belts are made to take the worst punishment and give the best service. They are scientifically designed to prevent internal friction while flexing . . . to stand terrific external shocks and abrasion. Pre-testing assures belts that defy moisture, wear and separation.

From the top of the tippie to the lowest level Quaker has the rubber product to speed production and cut maintenance. Whether it's flat transmission belts; V-belts; air, water or steam hose; or sheet packing, line up with Quaker and you'll cut down your maintenance.

QUAKER

RUBBER CORPORATION

DIVISION OF H. K. PORTER COMPANY, INC.

PHILADELPHIA 24, PENNA. BRANCHES IN PRINCIPAL CITIES



Lined with U-S-S Stainless Steel, this hopper chute at Sunnyhill Coal Company's preparation plant, New Lexington, Ohio, handles more coal faster than with previous linings. Stainless never needs cleaning after weekend shut-downs.

Sunnyhill speeds up carloading with hopper chutes of U-S-S Stainless Steel

● Here's another page from Sunnyhill Coal Company's amazing book of experience with Stainless Steel at its New Lexington, Ohio, preparation plant.

As a result of Stainless Steel's performance on its feed and discharge flumes, Sunnyhill recently completed installation of $\frac{3}{8}$ " plates of U-S-S Stainless Steel on car-loading hopper chutes. Increased service life and a smooth, corrosion-free surface were the expected benefits, but already, unlooked-for advantages have appeared.

Sunnyhill's management has discovered that the continuously-smooth surface of Stainless Steel increased the rate-of-flow equivalent to a 5% increase in chute elevation.

By using a flatter degree of elevation—with greater clearance between chute mouths and car tops—an extra ton can be loaded in each car. And loading time is still the same—four minutes.

Hopper chutes are only one of the many preparation plant applications where Stainless Steel's long life, resistance to corrosion and abrasion, and lower maintenance

and replacement costs have paid off for Sunnyhill and other companies. If you'd like the complete story, write for our booklet, "Stainless Steel at Sunnyhill." Send your request to United States Steel Company, Room 4296, 525 William Penn Place, Pittsburgh 30, Pa.



AMERICAN STEEL & WIRE COMPANY, CLEVELAND • COLUMBIA STEEL COMPANY, SAN FRANCISCO

NATIONAL TUBE COMPANY, PITTSBURGH • TENNESSEE COAL, IRON & RAILROAD COMPANY, FAIRFIELD, ALA. • UNITED STATES STEEL COMPANY, PITTSBURGH
UNITED STATES STEEL SUPPLY COMPANY, WAREHOUSE DISTRIBUTORS, COAST-TO-COAST • UNITED STATES STEEL EXPORT COMPANY, NEW YORK



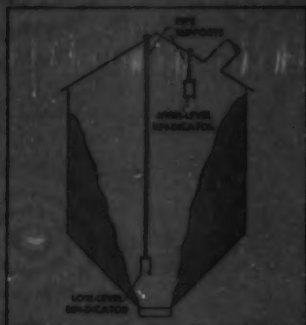
U-S-S STAINLESS STEEL

SHEETS • STRIP • PLATES • BARS • BILLETS • PIPE • TUBES • WIRE • SPECIAL SECTIONS

UNITED STATES STEEL

used in small totally enclosed fan-cooled AC Westinghouse motors have been found to offer many advantages over blowers of critical aluminum and bronze they replace. The new plastic blower is unaffected by chemical agents that attack the metals, is as much as one-third lighter, and has better resistance to abrasion, the company reports. Westinghouse currently is applying these new plastic blowers to totally-enclosed fan-cooled Life-Line motors in NEMA frames 254 and 254 (5 and 7½ hp, 1,750 rpm), and will use them in other motor lines—Westinghouse Electric Corp., Pittsburgh 30.

(18) **DC-INSULATION TEST UNIT** designed to prevent insulation breakdowns on all types of high-voltage equipment by detecting insulation weaknesses before breakdowns can occur is said by the maker to test at over or under the full operating voltage and will not impair the value of the insulation. Known as the TALK high voltage DC insulation tester, the portable unit is manufactured for ranges of 0 to 15 kv, 20, 45 and 75 kv. More details from The John Housen Co., New York 4.



(20) **BIN-LEVEL INDICATOR** for large bins, Model EM Bin-Dicator is designed for suspended installation from above and can thus be located wherever there is a free flow of material to and away from the diaphragm. Built for use on any size support up to 2 in., the unit can be easily moved up or down in the bin to operate at different levels or lifted out for inspection. Data from the Bin-Dicator Co., Detroit 13.

(21) **FAST-DRYING PROTECTIVE COATING** compounded of coal-tar pitch, new "Tarlac" is said to retain all the protective and adhesive qualities of coal-tar pitch, to be impervious to oils, greases, acids, alkalis, water and condensation, and not to crack at low temperature or run at high temperature. Recommended by the maker for concrete, masonry, metals, mastic or other black-top surfaces, and wood, Tarlac reportedly dries to a tough flat black film and is completely in-

soluble in water, oil or gasoline. Bulletin from Flash-Tite Co. Inc., Philadelphia 45.

(22) **HIGH-CAPACITY EXPULSION ARRESTOR**—New Westinghouse Deion Type LX expulsion-type lightning arrester for protecting distribution apparatus is said by the maker to incorporate a new method of limiting power follow current on systems having fault currents as high as 20,000 amp. A spiral fiber filler—heart of the arrester—provides longer arrester life and positive protection by lengthening the power arc path to four times the original spark path. Built to IEEE and NEMA standards, the Type LX arrester is available in ratings of 3, 6 and 9 kv, and will later be available in ratings of 12, 15 and 18 kv. Data from Westinghouse Electric Corp., Pittsburgh 30.

(23) **BIN VIBRATORS**—New line of Cannon Style EM "Quiet Type" vibrators are now furnished in 1½- to 4-in. piston sizes, ranging in weight from 9 to 160 lb. Used to prevent clogging, hanging-up and sticking in bins, hoppers and chutes, the units

are said to be unusually quiet in operation, featuring a new principle of air-cushioned impact that prevents all metal-to-metal pounding. Full details Cannon Vibrator Co., Cleveland 14.

(24) **TIMM - SAVING BUCKET TEETH** now are standard equipment on all Parsons Trenchliners, which are available in four sizes for digging trenches 5 to 72 in. in width up to 17 ft in depth. The self-locking Tap-In teeth eliminate the need for bolting or crimping edges to hold teeth in position and are made to retain a sharp point by constant use until worn down to clearance.—Parsons Co., Newton, Iowa.

(25) **LABOR-SAVING ANTI-RUST PAINT** which can be applied right over rust without wire-brushing, scraping or sandblasting, new "Rust-Gard" is available in black, aluminum and clear and may be used by brush or spray on either old or new metal. On application, it is said to penetrate any existent rust layer and effectively seal the surface against further rusting. Bulletin 127-11 from the Hercules Co., Cleveland 6.

EQUIPMENT BULLETINS AVAILABLE

(More Bulletins Listed on P 175)

(26) **SYNCHRONOUS MOTORS**—Standard construction features of the low speed, coupled-type, pedestal-bearing synchronous motors in ratings approximately 100 hp and larger at speeds of 450 rpm or less are described in Bulletin 95B7648 released by

Allis-Chalmers Mfg. Co., Milwaukee 2. The motors are applicable for direct-coupled drives with widely varying torque requirements.

(27) **EARTHMOVING UNITS**—Hydraulic and cable-controlled earth-

YES—I would like more information . . .

Please send me catalogs or further information about the items from the Equipment News Section whose numbers are circled (November 1951)

1	6	11	16	21	26	31	36	41
2	7	12	17	22	27	32	37	42
3	8	13	18	23	28	33	38	
4	9	14	19	24	29	34	39	
5	10	15	20	25	30	35	40	

In addition, please send me data on items OTHER products advertised in this issue (give name and page number)

Name (Print)

Position

Company

Address

NOT GOOD if mailed after Jan. 1, 1952

USE THIS CONVENIENT CARD

... TO GET MORE INFORMATION on products and bulletins mentioned in this Equipment News Section or for data on any product advertised in this issue. Circle item numbers, tear out and mail.

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PERMIT NO. 54
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THE EDITOR, COAL AGE

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NEW YORK 19, N. Y.

ing equipment manufactured by The Baker Mfg. Co., Springfield, Ill., to match Allis-Chalmers crawler tractors is described in new Baker Bulletin 894. Included are Baker engine-mount hydraulic-control ballflowers, Grass-builders and root-rippers (for the HD-5, HD-9, HD-18 and HD-30), and the three cable-control units (for the LD-5, HD-18 and HD-30). Specifications, operating features and applications are covered.

(26) **SPRAY NOZZLES**—spray guns, manifolds and hose and accessories for coal-spraying and other applications are described and illustrated in new 13-p Bulletin L-844 offered by the John Bean Div., Food Machinery & Chemical Corp., Lansing 4, Mich.

(29) **MAGNETIC SEPARATORS** and lifting magnets in the Diags Magnetic line are covered in a 13-p illustrated bulletin that tells which magnets to use to remove iron from wet or dry materials carried on conveyor belts, chutes, ducts, etc., and also discusses units for magnetic concentration and purification, heavy-media recovery and materials handling. Catalog C-5005-B is offered by the Diags Magnetic Separator Co., Milwaukee 45.

(30) **INDUCTION FREQUENCY CONVERTERS**—General Electric Co., Schenectady 5, N.Y., offers Booklet GEA-5837 covering Tri-Clad three-phase equipment in ratings from 1/2 to 100 kw. It describes the fundamentals, operation, and construction features of the high-frequency power-supply apparatus, with application information, modifications, limitations, etc.

(31) **EARTH MOVER**—Catalog 508 on the Hough Model HY 14-yd Pay-loader tractor-shovel illustrates its varied material-handling applications and discusses features such as full-reversing transmission, operator visibility and safety, full-hydraulic bucket control, power-booster steering and unit-design construction. Available from The Frank G. Hough Co., Libertyville, Ill.

CARD USERS NOTE—Please be sure to give your name, position and company to insure proper handling of your request. Since some cards have been received without names, we would be glad to have you check on it if you have no response to your request within a reasonable time.

(32) **PIPE COUPLING**—Bulletin from Morris Coupling & Clamp Co., Ellwood City, Pa., covers its new-type compression pipe coupling which is said to materially reduce electrolytic corrosion and turbulence at the pipe joint. The Morris coupling is made in sizes from 1/2 to 14 in standard pipe sizes, including intermediate tube sizes.

(33) **DRIVE SHAFTS**—Bulletin F41-61 from the Morse Chain Co., Detroit 8, gives complete data and specifications on Morse Radial Driveshafts with spline-jointed tubular shafts; Morse Universal Driveshafts with one-piece tubular shafts; and Morse Universal Driveshafts with spline-jointed tubular shafts; along with a working table of maximum recommended lengths and speeds.

(34) **ARC-WELDING HANDBOOK**—A pocket-size booklet, "Hobart Welding Electrodes and Welders' Vest Pocket Guide," available from Hobart Bros. Co., Troy, Ohio, provides a useful guide to better welding, with information on metals and electrodes, types of electrodes, proper welding procedures, color marking for electrodes, types of joints, typical positions, standard steel shapes, characteristics of the fillet weld, causes of common welding troubles, average electrode consumption, handy reference information and complete data on all Hobart electrodes.

(35) **PUMPS**—New 32-p Bulletin L-841 discusses in detail the construction and operating features of the John Bean line of high-pressure power

or pumps designed for handling liquids with a wide range of characteristics. Specifications, dimensions and other data are included. Available from the John Bean Div., Food Machinery & Chemical Corp., Lansing 4, Mich.

(36) **SPRAY PAINTING**—"Sprayways," a 16-p rotogravure brochure introduced by DeVilbiss, contains nearly 100 photographs that graphically display the many varied applications of spray equipment in finishing machines and equipment in various plants and industries. Available from the Spray Painting Equipment Div., DeVilbiss Co., Toledo 1.

(37) **WELDING-CABLE CONNECTORS**—New 13-p No. 3 "Twocore" illustrates and describes the complete line of Twocore electrode holders, ground clamps, cable connectors, terminal connectors, cable splices, mechanical and solder-type cable lugs, carbon electrode holders, with information on the care and maintenance of electric welding cables and connections. Twocore Products Co., Wichita, Kans.

(38) **POWER-PLANT EQUIPMENT** described and illustrated in a new 13-p bulletin includes Swarzwelt control valves, pressure master controls, damper-blasters, temperature master controls, water-regulating valves, liquid-level and drainage controls, differential pressure switches, feed-water heaters, feed-water regulators, separators, exhaust heads, air separators, and other accessories. Bulletin S-194-C available from the Swarzwelt Co., Cleveland 12.

(39) **WELDING ALLOYS**—Wall chart of Eutectic Low Temperature Welding Alloys contains detailed specifications on almost 200 metal-jointing alloys, including bonding temperatures, tensile strengths, recommended uses for a wide range of metals and varied applications. Offered by Eutectic Welding Alloys Corp., Fishing, N.Y.

(40) **SAFETY POSTER** available free for bulletin boards from Willson Products, Inc., Reading, Pa., shows two men with their dogs—one a hunter in the field and the other a blind man with his "Seeing Eye" dog. The punchline over the two photos is the challenging headline, "Which Dog Would You Rather Follow?"

(41) **HOW TO USE "Hi-Speed-It"** steel-hardening compound, applied in 4 min. on cutting and impact tools dies and for spot hardening to get longer service and better performance is thoroughly covered in Metallurgical Bulletin 14 from the Wilson Carbon Co., Inc., New York 17.

(42) **HIGH-SPEED EARTHMOVER**—16-p Catalog A-1285 describes in detail the features and operation of the Model TS-300 Motor Scraper, a high-speed rubber-tired self-propelled unit. Available from LaPlant-Chaste Mfg. Co., Cedar Rapids, Iowa.

3 reasons why you can't afford to buy Willson Automatic Couplers

1 SAFE

Willson Automatic Couplers require no manual assistance... no need for men to go in between cars to couple or uncouple a Willson Automatic!

2 FAST

All Willson couplers have the same contour... can be coupled at either end of car or locomotive... no time-consuming reversing is necessary.

3 STABLE

Close coupling of Willson couplers eliminates damaging slack... permits higher speeds with maximum stability... reduces surging and spilling.

4 PROTECTIVE

Two parts, the head and the lock, do all the work on every Willson coupler... take the shocks and strains to protect cars and locomotives from damage.

5 PROVED

Over 50,000 Willsons speed handling and cut costs in mines and industrial plants everywhere. Why not specify Willson Automatic Couplers for your haulage needs?

WRITE TODAY for circulars No. 1746 and No. 5240 for more information on Willson Automatic Couplers. National Malleable and Steel Castings Company, Cleveland 6, Ohio.

A-15-60

NATIONAL MALLEABLE and STEEL CASTINGS COMPANY

WILLSON AUTOMATIC COUPLERS • RACO STEEL WHEELS • RACO STEEL LINKS and SWIVEL HITCHES

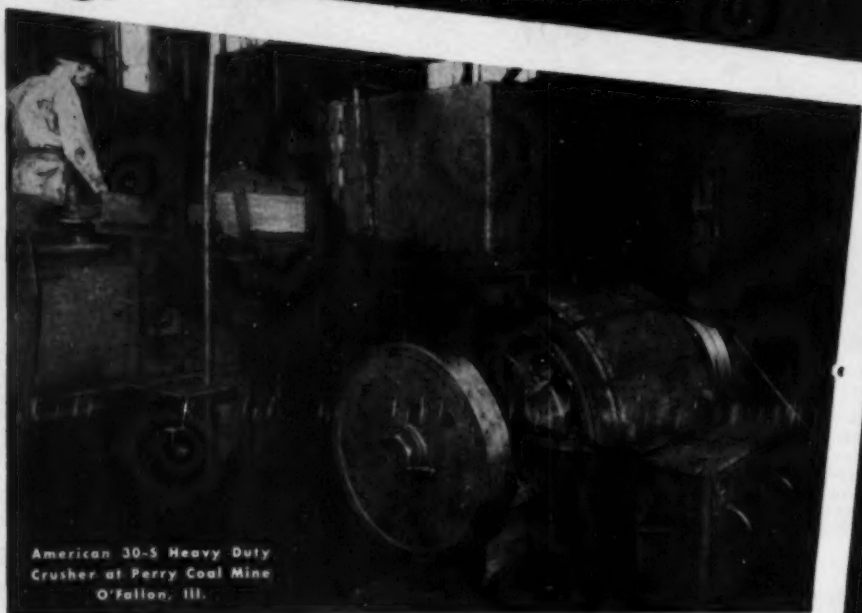




"CRUSHING" FACTS

on *American Crusher* PERFORMANCE

(Taken From An Independent Survey)



American 30-S Heavy Duty
Crusher at Perry Coal Mine
O'Fallon, Ill.

HEAVY DUTY *American* CRUSHER CUTS COSTS 66%!

Prior to the installation of this heavy-duty American Rolling Ring Crusher at the Perry Coal Mine in O'Fallon, Illinois, three men were stationed at the picking table—removing rock, slate, sulphur balls and foreign material that were either too large or too hard to reduce in the single roll crusher then in use.

Since the American installation, only one man is needed . . . this heavy-duty machine is tough enough to handle any size ROM coal hoisted, as well as rock impurities. Installed May, 1950, this American Crusher shows no sign of wear—even though all plus 7" coal and refuse from a 1,000,000-ton-a-year mine passes through it.

WRITE FOR FREE COAL BULLETIN

American

PULVERIZER COMPANY

Originators and Manufacturers of Ring Crushers and Pulverizers

1119 MACKLIND AVE., ST. LOUIS 10, MO.



Stripping AROUND a Mountain



THE CHAMP DIGS IN on the Meade Fork operation, where Dick Construction Company is strip mining for the Clinchfield Coal Corp. International's exclusive Planet Power Steering means pivot turns, feathered turns, turns with power on both tracks. 8 speeds forward, 8 reverse, with a shift up or down one speed without declutching.

How West Virginia mine operators strip the coal with International's "Big Red" TD-24

Down in the rough mountain country of Virginia and West Virginia, there's high-grade coal aplenty in seams up to ten feet thick. And the Dick Construction Company uses five International TD-24s to get at it.

They start stripping on a mountainside where a seam outcrops, and work around and around the mountain till they've stripped off the overburden to a depth of 50 to 60 feet. It's rough, tough, demand-

ing work, where the TD-24 is the Champ for sure.

One reason is the TD-24's maximum of 148 drawbar horsepower, more than any other crawler. The TD-24 can take huge bites of dirt and rock. It moves them faster, too, and backs up faster to get in position for another load. It does more work in less time. It moves more paydirt per day.

For the whole low-down on the TD-24, ask your friends who own them. Ask your International Industrial Distributor, too, and ask him about his well-equipped field service, always at your call. Find out all the answers. You'll be a TD-24 man from then on in!

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INTERNATIONAL



POWER
THAT PAYS



PARTS REPLACEMENT DRASTICALLY REDUCED. Checking his records after 17 months' top performance from Sun Rock Drill Lubricant, the operator of this Pennsylvania mine found that parts replacement had been reduced 67 percent. The product he had used before kept running off the drills, and downtime was excessive.



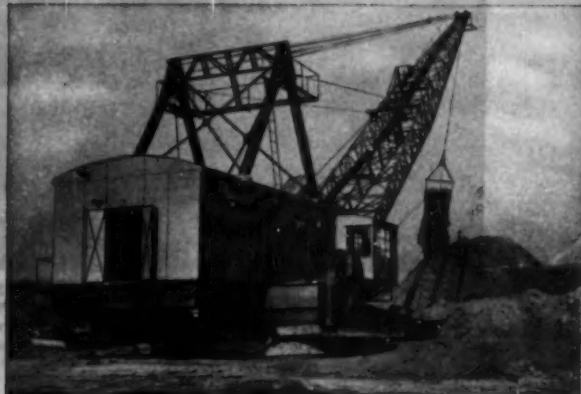
PRODUCTION UP, LABOR COSTS DOWN. Gummy deposits in the transmission case and heads forced the operator of this mine to shut down his loader every two or three days. Changing to a Sun "Job Proved" product, he now has to grease it only every two or three weeks, and he estimates his savings on maintenance at over \$1,600 a year.

SUN PRODUCTS GET THE JOB DONE

These four examples show how



14 YEARS UNDER PRESSURE AND GOING STRONG. This compressor has been running 16 hours a day ever since its installation, and is working as well as ever. From the start, a Sun lubricant has been used for the crosshead and air cylinder. No hard carbon has formed, and during the past five years there has been only one shutdown—when a different brand of oil was used by mistake.



DIESEL PERFECT AFTER 13,000 HOURS. Thanks to the constant protection of Sunvis H.D. 700 Oil, the pistons were clean, the oil grooves open, the rings free. No signs of seizure or scoring of skirts. Not one of the cylinders showed more than 1/1000 inch wear, the bearings were perfect, the entire engine was clean and free of sludge or varnish. Analysis of the oil showed it to be in good condition.

For further information or the services of a representative, call the nearest Sun Office

SUN INDUSTRIAL PRODUCTS

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NEWS Round-Up

TVA Buys 18,043,750 Tons of Coal; Annual Use to Reach 13,000,000 Tons

THOUGHT TO BE THE LARGEST SINGLE PURCHASE OF COAL on record, contracts for 18,043,750 tons of coal to be delivered over the next 10 yr were announced by the Tennessee Valley Authority Sept. 28.

With contracts announced several weeks earlier, TVA had through September agreed to purchase a total of 27,795,750 tons of coal for use at its five steam plants, at a total cost of \$92,647,705. All the contracts except two are subject to 20% increase or decrease in tonnage at TVA's option and are for periods ranging from 10 mo to 10 yr. Contract prices vary from \$2.45 to \$4.70 a ton.

TVA consumption of coal will reach 13,000,000 tons annually by 1956 with the installation of supplementary generating units and new steam plants to meet the increasingly heavy power demands of private industry and national defense, it was reported. During the past 10 yr the TVA has con-

sumed an average of 800,000 to 900,000 tons of coal annually. Its past ratio of approximately 14% steam power to 86% hydroelectric will change so that eventually steam power will provide almost 50% of total capacity of the system. By 1954, coal consumption is expected to be at an annual rate of 7,750,000 tons.

The contracts announced in September, with the length and total tonnage to be delivered, were as follows:

KINGSTON STEAM PLANT: Love & Amos Coal Co., 10 yr, 5,000,000 tons; Bransford Coal Co., 10 yr, 5,000,000.

SHAWNEE STEAM PLANT: Southern Coal Co., Inc., 10 yr, 3,000,000; W. L. Moore Coal Co., 5 yr, 2,500,000; Sterling-Midland Coal Co., 10 yr, 3,400,000, and 7 yr, 2,450,000 at the TVA option.

JOHNSONVILLE STEAM PLANT: Capitol Coal Sales, Inc., and

Green Coal Co., 5 yr, 1,500,000; Southern Coal Co., Inc., 10 yr, 2,000,000.

WIDOWS CREEK STEAM PLANT: National Coal & Coke Co., 3 yr, 150,000; Capitol Coal Sales, Inc., 3 yr, 360,000, and 2 yr, 48,000; Capitol Coal Sales, Inc., and Cecil Hitchcox, 3 yr, 39,000; Associated Coal Co., 3 yr, 216,000; Premier-Cumberland, Inc., 5 yr, 500,000; Whitwell Coal Corp., 1 yr, 50,000; H. A. Griffith, 5 yr, 520,000; Capitol Coal Sales, Inc., and J. R. Morrison, 3 yr, 39,000; Plateau Coal Co., 1 yr, 100,000.

WATTS BAR STEAM PLANT: Love & Amos Coal Co., 21 mo, 306,250; Bransford Coal Co., 21 mo, 262,500; Logan & Kanawha Coal Co., 10 mo, 110,000; Sterling-Midland Coal Co., 10 mo, 80,000; Capitol Coal Sales, Inc., 10 mo, 20,000; Harriman Coal Co., 10 mo, 50,000; Williams Coal Co., 10 mo, 75,000; Volunteer Fuel Co., Inc., 10 mo, 20,000.

UMWA Fund Surplus Totals \$99 Million After 4 Yr

The UMWA Welfare and Retirement Fund had a surplus of \$99,339,642 at the end of its fiscal year June 30, according to a comprehensive report of the Fund's expenditures released early last month. During the 4-yr period from May, 1947, when the first Fund benefits were paid, \$254,018,264 has been paid out in benefits and services and 721,000, men, women and children have been aided, the report shows. Total expenditures were \$261,022,128 and revenues from coal royalties totaled \$359,499,580. Total income was \$360,361,771, including \$862,190 in interest on government securities.

According to statement by Miss Josephine Roche, administrator of the Fund and one of its three trustees, benefits now are being distributed at the rate of about \$9 million a month and receipts are currently running above expenses.

Later, on Oct. 10, the Fund announced approval of loans to three non-profit charitable corporations for the construction of hospitals over a

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3-yr period in 10 coal-mining communities. Considered by the Fund trustees as the best method of providing hospital and medical care to its beneficiaries, the loans are being made to the Memorial Hospital Associations of Kentucky, West Virginia and Virginia. The hospitals will be built in the general area of Harlan, Cumberland, Hazard, Pikeville, Jenkins and Wheelwright, Ky.; Beckley, Williamson and Logan, W. Va.; and Coeburn, Va.

Gas Appliances Head Urges Large-Scale Coal Plants

A large-scale conversion-plant system to fortify and coordinate U. S. fuel supplies by using the nation's immense coal reserves to produce gas of uniform quality for peak-load requirements was proposed Oct. 17 by Frederic O. Hess, retiring president of the Gas Appliance Mfrs. Assoc.

Speaking before more than 1,000 delegates to the 33rd annual convention of the American Gas Association in St. Louis, Mr. Hess challenged the gas industry to "take advantage of the fact that we can make gas from coal, gasoline from coal and oil from coal."

Mr. Hess, who also is president of the Selas Corporation of America, designers of heat processing equipment for heavy industry, warned "we do not have enough natural gas or gas lines in the East and North to solve the problem of disproportionate summer and winter supply, of storage and even of the varying burning characteristics of the different types of gas now in use."

(Continued on p. 166)



NATIONAL SAFETY CHAMPS are these teams from the Maple Hill colliery, Philadelphia & Reading Coal & Iron Co. (left), first-aid winners, and the UMWA, District 16, mine rescue leaders, at the banquet held at the conclusion of the 3-day nationwide contest.

Columbus Safety Meet Crowns National Champions

VICTORS' LAURELS in the "Olympic Games" of mining—the National First-Aid and Mine-Rescue Contest—were won by the first-aid team representing Maple Hill colliery, Philadelphia & Reading Coal & Iron Co., Shenandoah, Pa., and the mine-rescue team sponsored by the United Mine Workers of America, District 16, Kitzmiller, Md., in the 3-day competition at Columbus, Ohio, Oct. 2-4.

This year's contest, in which some 70 top teams from various regions participated, marked the resumption of nationwide safety competition for the first time in 20 yr. It was conducted under the auspices of the USBM and the Joseph A. Holmes Safety Association, with the cooperation of the UMWA, the NCA and various state departments of mines.

Moving from fourth place in the 1950 first-aid competition to first place in 1951, the Maple Hill colliery team headed 54 other top-flight teams from 10 states in a 2-day, 11-problem contest Wednesday and Thursday. Members of the Maple Hill team were: George Moss, captain, Joseph Gayuski, William Baker, Joseph McCall, H. A. Wheat, Anthony Yanowski and Francis Whalen.

Competing against 14 other mine-rescue teams on Tuesday, the UMWA squad set the pace under the leadership of Carl Schell, captain. Mr. Schell's teammates were Chester Evans, Carl Paugh, Mervin Sims, Lee Hartman and Richard Sherwood.

Capt. Schell's mine-rescue team received a congressional medallion from Dr. James Boyd, director, USBM; the UMWA trophy from John Owens, UMWA secretary-treasurer; the Coal Age trophy from J. J. Forbes, chief Health and Safety Div., USBM; and safety lamps donated by the Coal Operators' Casualty Co. Capt. Moss' first-aid champions received a congressional medallion from Dr. Boyd; the National Coal Association trophy

from John D. Battle, NCA executive vice president; and the Coal Age trophy from Mr. Forbes.

Second honors in the mine-rescue competition was won by the team from Robena mine, U. S. Steel Co., Uniontown, Pa., led by Peter Yadamie, captain. In third place was the team representing Clover Splint mine, Consolidation Coal Co. (Ky.), Closplint, Ky., Earl Poff, captain. The Robena team received a NCA trophy, and the Clover-Splint team was awarded a Mine Safety Appliances Co. trophy, which was presented by George H. Dieke, MSA president.

Runner-up in the first-aid contest

was the team of Indianola mine, Republic Steel Corp., Indianola, Pa., captained by Vincent Stanec. In third place was last year's runner-up, the team representing Mine 214, Consolidation Coal Co. (Ky.), Jenkins, Ky., Warnie Flint, captain. A combination team from Dun Glen (Ohio) No. 11 mine, Hanna Coal Co., participated in both the mine-rescue and first-aid events and was awarded an MSA trophy by Mr. Dieke.

Winners were announced and awards presented at a banquet in the Neil House, Columbus, Thursday evening, at which E. H. Davis, president New York Coal Co., was toastmaster.

News Briefs and Trends

Coal Exports Licensed; New Mark Set in September

Export of coal to all countries except Canada last month was put under government allocation and licensing, effective Nov. 1. The order, which will be administered jointly by the ECA and the Office of International Trade in the Department of Commerce, came not as a result of coal shortages but only because of what the government called "severe congestion" of port facilities at Hampton Roads, Va. Under the program, which was opposed as unnecessary by coal exporters, each country will be permitted a quota for shipments through Hampton Roads, with the rest of the allocation going through other ports. Coke, already under export control, will be included in the program. Meanwhile, coal dumpings at Hampton Roads reached an all-time high of 3,694,355 tons in the month of September. The previous record had been 3,631,064 in the Au-

gust, 1947. In an effort to relieve the shipping situation, the ECA Oct. 9 asked the National Shipping Authority to reactivate an additional 100 Liberty ships from the government's mothball fleet for transport of coal. With them, the ECA would have some 400 ships actively engaged in carrying coal to Europe.

Coal-Fired Electric Plants Sought for Pacific Northwest

Following support from various witnesses including Secretary of the Interior Chapman, the House Public Works Committee early in October approved a bill authorizing construction of three 100,000-kw steam and five 20,000-kw gas-turbine auxiliary standby electric-generating plants by the Bonneville Power Administration at an estimated cost of \$60 million. While not regarded primarily as an emergency measure, the bill was

(Continued on p 152)

**Totally-Enclosed
Fan-Cooled
MOTORS**

Less MOTOR CLEANING ... INSPECTION ... OVERHAUL!

HERE'S A MOTOR that actually blows itself clean! Dirt is carried away by cooling air blown over the ribbed cast iron frame and bearing housings of this new Allis-Chalmers tefc motor.

Dirt can't build up to cause overheating. Concealed air passages and pockets have been eliminated. Even oily dirt that sticks can simply be wiped or blown off.

And this means savings! Maintenance costs are traditionally low on totally-enclosed, fan-cooled motors. But they're lower than ever before on the new Allis-Chalmers Type APZ tefc motor.

Rigid Construction

The frame is cast iron which has high

resistance against corrosion and distortion. Bearings are pre-lubricated at the factory and should need no attention for years. Tapped holes with pipe plugs to permit regreasing and to provide grease relief are standard equipment.

Get All The Facts

The new Allis-Chalmers Type APZ totally-enclosed, fan-cooled motor is built in all NEMA standard frame sizes from 224* to 505. Also in explosion-proof type. Your A-C Authorized Distributor or District Office has complete information. Call today, or write Allis-Chalmers, Milwaukee 1, Wisconsin. Ask for Bulletin 51B7225.

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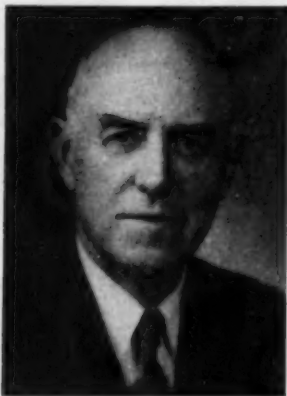
TEXROPE — Belts in all sizes and sections, standard and Vari-Pitch sheaves, speed changers.



PUMPS — Integral motor and coupled types from 1/2 in. to 72 in. discharge and up.

*Similar design non-ventilated motors Type APK, also available in frames 203 to 224 inclusive.

Personal Notes



Matthews Heads Pocahontas Fuel

ARMSTRONG R. MATTHEWS (left) has been elected president of the Pocahontas Fuel Co., Inc., New York, effective Nov. 1, to succeed Hugh R. Hawthorne (right), who becomes chairman of the board of directors. An engineering graduate of Lehigh University, Mr. Matthews comes to Pocahontas Fuel from the Clinchfield Coal Corp., Dante, Va., where he served as president since 1946. He also has been a vice president of the Pittston Co. since 1947. Mr. Hawthorne joined Pocahontas Fuel in 1918 as secretary and general counsel and held various positions of increasing responsibility leading to his election as president last year.

Edwin R. Keeler, chairman of the board of directors, Franklin County Coal Corp., Chicago, resigned Oct. 1 as an active officer of the corporation to devote his entire time to the direction of his other interests, particularly the Rockford Lumber & Fuel Co. and subsidiaries, of which he is president. Mr. Keeler has spent his entire business career in the coal industry with Franklin County and its predecessor, the Taylor Coal Co., serving successively as salesman, sales manager, vice president, president and chairman of the board. During the past year, he has been president of Southern Illinois Coals, Inc., and a director of the Illinois Coal Operators' Association.

Ayrshire Collieries Corp., Indianapolis, last month announced the promotion of Roy E. Dean to the post of assistant to the president, succeeding G. Don Sullivan, who resigned to join the staff of the NCA in Washington. Following his army service in the African and European theatres during World War II, Mr. Dean joined the Ayrshire organization in 1946.

Chester H. Cook, formerly vice president, has been elected president of the Sunday Creek Coal Co., Columbus, Ohio, succeeding his father, the late Chester C. Cook. Carlton S. Dargusch is now chairman of the board of the company.

The Freeman Coal Mining Corp., Chicago, a subsidiary of the Material Service Corp., last month announced

that John L. Sullivan had joined the organization as a vice president. Mr. Sullivan recently retired as general superintendent of the H. C. Frick Coke Co., Pittsburgh, in which capacity he had served since 1940. Previous to his transfer to the Frick organization in 1939, Mr. Sullivan had been assistant general superintendent for the U. S. Coal & Coke Co. at both its Gary, W. Va., and Kentucky divisions.

Raymond E. Zimmerman has been appointed chief preparation engineer, Coal Div., U. S. Steel Co. A graduate of Penn State College, Mr. Zimmerman was preparation manager of the Hanna Coal Co. when he became chief of the division of mineral preparation in the Penn State School of Mineral Industries in 1948. In the Frick district of the U. S. Steel Coal Div., Elmer G. Anderson has been appointed superintendent of maintenance. Robert R. Goddard has succeeded Mr. Anderson as electrical engineer.

Louis Austin has been promoted to the post of assistant superintendent of the Gorgas mine, Alabama Power Co. Before joining the company early this year as an industrial engineer, Mr. Austin had been associated with the Alabama By-Products Corp., Southern Minerals Co. and other organizations.

F. L. Lovings retired last month as superintendent of the Pardee mine, Blackwood Fuel Co., Inc., Pardee, Va. Mr. Lovings, who has been associated

with the company since its founding, expects to devote all his time to farming now.

Joseph T. Berta, formerly president of the Pennsylvania Coal & Coke Co., has been named president of Pattison & Bowns, Inc., according to an announcement by Joseph P. Routh, chairman of the board of The Pittston Co. Mr. Berta succeeds Bruce Payne, who will devote his full time to his post as president of Payne Coal Sales, Inc.

Otto Heyer, superintendent, Federal No. 1 mine, Coal Div., EG&FA, Grant Town, W. Va., retired Oct. 1 after more than 40 yr with EG&FA and predecessor companies. One of his last official duties was to present Harry L. Conner, master mechanic at Grant Town, with the first retirement check issued under the company's new plan. The two men had worked together for the past 26 yr and retired only a few days apart. Mr. Heyer began at Grant Town in 1911, became general mine foreman in 1919 and was promoted to superintendent in 1933. E. W. Potter, Beards Fork superintendent since his transfer from Powellton No. 6 last spring, has been appointed to succeed Mr. Heyer at Grant Town. Wayne Plymale, Jr., superintendent at Powellton No. 6 since last spring, has been transferred to Beards Fork, to succeed Mr. Potter. Eugene L. Whitt, general mine foreman, has been promoted to superintendent, Powellton No. 5 mine. At the Carswell mine, W. L. Laxton, general assistant mine foreman, has been advanced to general mine foreman. He succeeds Terry Chandoha, who resigned to become superintendent for the Central Coal Co. at New Haven, W. Va. John J. Kodak, formerly resident engineer at Federal No. 1 mine, has been transferred to Keystone in the same capacity, replacing Earl H. Bourland. E. B. Tubridy, division engineer, will serve as resident engineer at Federal No. 1 in addition to his regular duties.

Dr. Robert T. Gallagher, a member of the faculty at Lehigh University since 1942, last month was named head of the department of mining engineering, succeeding the late Prof. A. Copeland Callen. A native of Johnstown, Pa., Dr. Gallagher is a graduate of Penn State College and received his master's degree and doctorate at the University of Missouri and the Colorado School of Mines, respectively.

Harry J. Dusz, of Trimble, Ohio, has been appointed chief of the Ohio Division of Mines in the State Industrial Relations Dept. Mr. Dusz, whose appointment was effective Oct. 1 for a 6-yr term, succeeds Stephen Williams whose statutory term expired. A former miner, Mr. Dusz has been a member of the State Mine Examining Board since 1947.

Robinson & Robinson, Mining Engineers, Charleston, W. Va., has announced the addition to its staff of E.

GET 99%+ RECOVERY

OF SALABLE COAL

Close to 100% recovery is not uncommon at mines where coal is cleaned by the Chance "heavy density" Sand Flotation Process. This high degree of separating efficiency is possible because the mixture can be regulated so closely that even "near gravity" coal can be recovered. Also, you get:

High degree of flexibility — ability to handle coal at operating gravities from 1.35 to 1.65, with size range as wide as 10" x $\frac{1}{8}$ " to one washing unit.

Dependable performance — steady, uniform, trouble-free operation. Specific gravity of mixture remains constant; efficiency of separation is unaffected by fluctuating loads or changing qualities of coal.

Easy operation — change-over from one washing gravity to another can be made in five minutes, simply by opening or closing valves... all under one-man control.

Recover *more* salable coal... better cleaned coal... the economical, Chance Process way. Our engineers will be glad to cooperate with you in solving any of your coal-cleaning problems.



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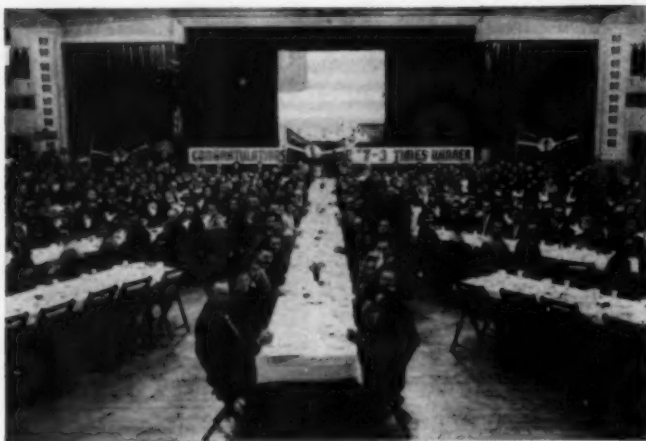
NEW YORK 17

PHILADELPHIA 5

CHICAGO 2

WITH A BACKGROUND OF OVER SIXTY YEARS' EXPERIENCE

U. P. Mine Awarded Trophy for Third Non-Accident Year



A NEW MILESTONE in mine-safety history was achieved by officials and employees of Reliance No. 7 mine of the Union Pacific Coal Co. Sept. 21 when they received, for the third consecutive year, the Sentinels of Safety Trophy in the bituminous division of the 1950 National Safety Competition. In making the 3-yr record, unequaled

in the 26 yr of the National Competition, the men of Reliance No. 7 marked up a total of 1,219,728 man-hours of operation without a lost-time injury. The perfect record was still continuing through 1951, at the time of the presentation.

The award marked the 12th time in the 18 yr of company participation

in the competition that mines of the Union Pacific Coal Co. had received the Sentinels of Safety Trophy. Presentation was made at a dinner (left) held by the company to honor the men of Reliance No. 7, which was preceded by a parade through the city of Rock Springs. Guests included, in addition to wives and sweethearts, various state and federal officials and industry leaders.

The Sentinels of Safety Trophy was presented by Theodore Marvin, director of *The Explosives Engineer*, and was accepted by H. C. Livingston, Union Pacific Coal vice president in charge of operations, who served as toastmaster. Other company officials participating in the ceremonies were: I. N. Bayless, president; V. O. Murray, general manager, and Lawrence Welsh, Reliance mine superintendent. A. J. Seitz, executive vice president, and H. E. Shumway, general manager, Union Pacific R. R., also offered their congratulations.

Main speaker of the evening was Thomas A. Burke, director of programs, Community Safety Councils, National Safety Council. Among the other speakers were: Gov. Frank A. Barrett, of Wyoming; J. H. East, Jr., regional director, USBM; and Robert R. Rose, Assistant Secretary of the Interior.

D. Conway, Jr., formerly associated with the Coal Div., EG&A. Plans for the sailing late in September of A. F. Whitt and Guy Browning, with their families, also were announced. Mr. Whitt, formerly with the Binkley Coal Co., will be stationed in Brussels, Belgium, for the company for approximately 1 yr. Mr. Browning, previously associated with the American Gas & Electric System, will be stationed in Liege, Belgium, for 1 yr.

Lloyd R. Jackson, a member of the staff since 1935, has been named assistant director of Battelle Memorial Institute, Columbus, Ohio, in charge of research coordination.

E. F. Maurer, formerly president of the Rail & River Coal Co., has been named general manager for the Powhatan Mining Co. in charge of Powhatan Mines Nos. 1, 2 and 3. The appointment followed the announcement of the acquisition of the Rail & River Coal Co. by the North American Coal Corp., and plans for operation of its No. 3 mine as Powhatan No. 3 mine (*Coal Age*, October, p. 132). Mr. Maurer will continue to have his headquarters in Bellaire, Ohio.

G. R. Watkins, formerly assistant to the general manager, has been named acting general manager of the U. S. Fuel Co., Salt Lake City. He replaces S. J. Craighead, who, because of illness, has been relieved of his respon-

sibilities as general manager and has been appointed consulting engineer, according to an announcement by W. C. Page, vice president.

Otto H. Kolak has been made superintendent of Mines Nos. 37 Upper and 40 Lower, Berwind-White Coal Mining Co., Windber, Pa. Mr. Kolak, who joined the company in 1919, formerly was foreman of Mine No. 37 Upper.

Obituaries

Chester C. Cook, 69, president and chairman of the board of the Sunday Creek Coal Co., Columbus, Ohio, died Sept. 26 at his home after an illness of some months. Mr. Cook, who had been associated with Sunday Creek since the age of 20, had other varied business interests and had long been active in numerous civic and community affairs. During World War II, he served as transportation coordinator in Columbus.

Joseph H. Kerrick, 58, a research engineer for the Philadelphia & Reading Coal & Iron Co., died Sept. 25 at his home in Philadelphia. A graduate of Lafayette College, Mr. Kerrick joined P & R in 1932 and at the time of his death was a member of the Technical Advisory Committee of the Anthracite Institute and the Anthracite Research Advisory Committee of Penn State College.

Max Grant Dillon, Sr., 65, a mining engineer associated with the Glen Alden Coal Co. for the past 37 yr, died Oct. 5 at his home in Kingston, Pa., after an illness of several months.

Thomas O. McCune, for many years a safety engineer with the Pittsburgh Coal Co., was killed Sept. 16 in an automobile accident near North Bay, Ont.

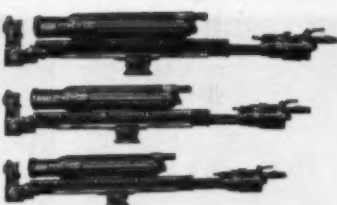
John J. Fox, 54, president of the Crystal Coal & Coke Co., and vice president of the Virginia B. Coal Co., Bluefield, W. Va., died Oct. 18 following a heart attack as he was returning to his office after visiting a physician. Mr. Fox had been active in the coal industry in West Virginia since 1915.

Boyd Leaves Mines Bureau

The resignation of Dr. James Boyd as director of the U. S. Bureau of Mines, effective Oct. 16, was announced Oct. 1 by Pres. Truman. Dr. Boyd, who has been in government service for some 10 yr and has served as Bureau director since 1947, was to join the executive staff of the Kennecott Copper Co. According to reports, Dr. Boyd's disagreement with the program for development of synthetic-fuel plants currently being pushed by the Department of the Interior was a major factor in his decision to resign. Thomas Miller, assistant director, is expected to serve as acting director until a successor is named.



★ Air-feed sinkers — 2-way feed, 2 sizes. They take the back-breaking work out of drilling horizontal holes, lighten the load on your miners, and increase tonnages.



★ Power-feed and hand-cranked drifters. Dependable, powerful, and fast. Ideal for columns and jumbo drills.



★ A complete line of sinkers from 18 to 80 lbs., including the popular 45-lb. H10, and 55-lb. H111.



★ The SDR 34 shaft sinker for faster shaft sinking. Fully closed it's 5'6" between drill centers; open 19'3". All adjustments quickly made with air motor.



★ Stoppers for every need — the 90-lb. S11, the 120-lb. SS-22, and a complete line of offset stoppers with 36-inch steel chomps for deep holes, or with short feeds for confined spaces.

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Rock Drills You Can Count On

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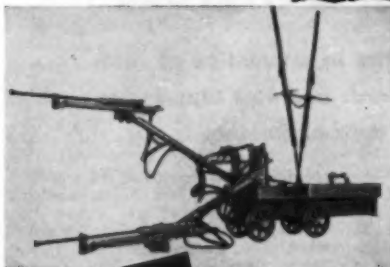
Of course, you know that Le Roi-CLEVELAND builds the popular, easy-holding H10 and H111 sinkers... the fast-drilling PD24, 25, and 14 power feed drifters... the S11 and SS22 stoppers with trip rotation for easier handling... and a mine jumbo that lets you drill out your rounds faster, with greater safety.

But did you know that Le Roi-CLEVELAND was responsible for some famous "firsts"? Here are a few of them—work-savers that help your miners increase their man-shift pro-

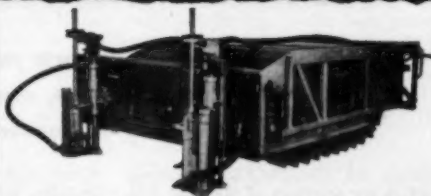
duction: the air-feed sinker, the offset stopper, the shaft sinker, the stopper jumbo.

So if you have a job of drilling to do—do it with Le Roi-CLEVELAND machines. You can count on them. They're built for speed. And they're built to stay underground, too—where you can see this speed to do more work and cut your costs.

Detailed information about the complete Le Roi-CLEVELAND rock drill line is yours for the asking. Just write us.



★ The famous MDR Jumbo with air-motor powered booms for quicker set-ups, greater safety, faster rounds.



★ Stoper jumbo — self-propelled with its own integral dust-collection system for positive dust control, the latest thing for roof bolting.



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INDUSTRY MEETING—A Special Coal Age Staff-Written Report



FIRE HAZARDS AND TRAINING—Arthur Bradbury (left), safety director, Inland Steel Co.; G. H. Sambrook director of mine inspection, U. S. Steel Co.; Charles Ferguson, assistant director of safety, UMWA, and O. C. Gibson, mine superintendent, Hanna Coal Co.



NEW OFFICERS—J. M. Reid (left), Hudson Coal Co., vice chairman; S. H. Mooney, Woodward Iron Co., chairman, and J. V. Berry, Bethlehem Coll. Corp., vice chairman.



ROOF AND HAULAGE SAFETY—John Williamson (left), Peabody Coal Co.; Arch J. Alexander, W. Va. Department of Mines; M. J. Ankeny, USBM; A. E. Crook, Ministry of Fuel & Power, London, England; W. R. Kirkwood, TCI; and D. S. Kingery, USBM.

Safety-Promotion Ideas and Problems Discussed by Coal Men at . . .

39th National Safety Congress

Coal Mining Section reports results and practice in prevention of roof-fall and haulage accidents, control of fire hazards and dust suppression at the face —“Pioneer Miners” offer their experience

OVER 200 DELEGATES participating in the meetings of the Coal Mining Section of the National Safety Council heard papers and discussions covering vital issues in mine safety during the 4-day National Safety Congress at Chicago, Oct. 8-11.

Features of the program, which was arranged by a committee headed by J. J. Forbes, chief, Health and Accident Prevention Div., USBM, Washington, D. C., were a Tuesday afternoon panel of six miners and super-

visors, each with at least 50-yr experience, and a joint luncheon of the Mining and Coal Mining Sections of the Congress. At the luncheon A. E. Crook, principal inspector of mechanical engineering in mines, Ministry of Fuel and Power, London, spoke on “My Impressions of Mining in America,” describing his recent 5-week trip through coal and metal mining areas of the United States and Canada. Mr. Crook also discussed underground haulage practices in Great Britain at

the Wednesday session of the section.

Officers of the Coal Mining Section for the coming year are: Stanley H. Mooney, Woodward Iron Co., Woodward, Ala., general chairman; J. V. Berry, Bethlehem Collieries Corp., Johnston, Pa., first vice chairman; and J. M. Reid, The Hudson Coal Co., Scranton, Pa., second vice chairman.

Speakers at the Monday afternoon session were: G. H. Sambrook, director of mine inspection, U. S. Steel Co., Pittsburgh; Charles Ferguson,



LIFELONG SAFETY—F. J. Bailey (left), Cardox; John Sidmon, Tom Prentice, Tom Lowe, George Stewart, Charles Davis, Ed Flynn.



DUST SUPPRESSION—J. V. Barry (left); James Westfield, USBM; W. J. Evans, Washington's chief inspector; W. M. Merritts, USBM.

assistant director, safety division, UMWA, Washington, D. C.; and O. C. Gibson, superintendent, Dun Glen No. 11 mine, Hanna Coal Co., Dun Glen, Ohio. Arthur Bradbury, safety engineer, Inland Steel Co., Wheelwright, Ky., and general chairman of the Coal Mining Section, presided.

Preventing Belt Fires

For the prevention and control of fire hazards in belt-conveyor installations, Mr. Sambrook suggested that precautionary steps be taken as follows:

1. Maintain strict cleanliness around belt installations to prevent friction from developing between the belt and accumulations of coal or other stationary objects.
2. Patrol belt lines to be certain that the belt is training properly and all rollers are revolving.
3. Provide water lines along the belt and fire extinguishers at strategic points along the system.
4. Observe safety rules on gathering belts of a more temporary nature as well as on main-haulage belts.
5. Provide good telephone communication and caches of self-rescue-type apparatus for use in case of fire.

Safety Courses Cut Injuries

On cooperative safety training of safety committeemen and miners, Mr. Ferguson said: "The value of safety education has been well demonstrated at a mine where all of the employees completed the [USBM] standard accident-prevention course in 1949. At the end of that year the mine had a rate of 98.5 injuries per million man-hours of exposure—nearly twice the average rate for the nation. At the end of 1950, the first year after the training was completed, the rate had taken a nose dive to 11.0 injuries per million man-hours—a phenomenal reduction of more than 88%. For the first half of 1951 the rate was reduced still further to 4.6 injuries per million man-hours, which undoubtedly is one of the lowest rates in the nation."

Mr. Ferguson also emphasized that the UMWA organization stands ready to cooperate with producing companies in increasing the coverage of safety training via the standard 20-hr course, and the new short courses for haulage employees and for all men exposed to roof-fall hazards.

Hanna Contest Shows Results

In describing Hanna Coal Co.'s slogan contests as a safety incentive, Mr. Gibson pointed out how their winning slogan for 1951, "I. O. U. Safety," has lent itself to varied applications, such as pledge cards (IO-U's) which were signed and exchanged among supervisors, safety committeemen and workers, reflector-type banners for the bumpers of employees' automobiles, decals for windshields, and so on. Mr. Gibson explained that the contest was designed to keep safety in the minds of all Hanna employees and their families. The main prize offered by the company in this annual contest is a 3-day trip to New York for the winner and his wife. While not implying that all credit for safety gains could be given to their contest, Mr. Gibson quoted figures which showed that safety has progressively improved since the contest was started. Recognition of the safety problem and aggressive promotion of the means chosen to improve conditions are necessary, Mr. Gibson concluded.

At the Tuesday session, with Mr. Bradbury presiding, speakers were: Arch J. Alexander, chief, W. Va. Department of Mines; John Williamson, superintendent, Mine No. 40, Peabody Coal Co., Galatia, Ill.; and the panel of Coal's 50-yr veterans, with Fred Bailey, safety director, Cardox Corp., Chicago, Ill., acting as panel moderator. Panel members were: John Sidmon, aged 73; George Stewart, 70; Tom Prentice, 70; Tom Lowe, 70; Edward Flynn, 73; and Charles Davis, 78.

Messrs. Sidmon, Prentice, Lowe, Stewart and Davis are members of the Pioneer Safety Miners' Club, Blue-

field, W. Va., which was organized by Mr. Bailey. Mr. Flynn still works as assistant to Nathaniel Kirk, safety engineer, Union Collieries Co., DuQuoin, Ill.

Roof Bolts "the Remedy"

The first half of the program, a symposium on roof bolting, was opened by Mr. Bradbury, who summarized the findings presented in USBM Information Circular 7605 entitled "Roof Falls, the No. 1 Killer in Coal Mines, 1950," and an interim Bureau report on the same subject for the first half of 1951.

Mr. Alexander stated that a study of accidents occurring in West Virginia between 1945 and 1951 shows that roof-falls contributed to 51% of the 1,488 fatalities. The reasons listed by Mr. Alexander included lack of timbering plans, unavailability of timber, lack of hazard consciousness and insufficient or ineffective supervision. For most West Virginia mines, the remedy, according to Mr. Alexander, is a properly planned and executed program of roof bolting.

Tracing the history of roof bolting through its technical development and the necessity of selling it to the men, Mr. Williamson stressed the fact that bolting to the face leaves only the roof over the cut unsupported. On the other hand, timbers cannot be set against the face because of the room required for maneuvering the cutting and drilling equipment. The unsupported roof area is reduced by almost 50% if a well-planned system of roof bolting is applied, Mr. Williamson said. The benefits of good roof bolting are fewer accidents, higher recovery in hitherto unminable seams and perhaps an eventual solution to the oldest problem in mining, roof control, Mr. Williamson concluded.

Veterans Cite Experience

In the latter half of the Tuesday session, Mr. Bailey introduced the
(Continued on p 194)

Fuel Men Weigh Progress, Problems

Joint AIME-ASME Group Hears:

**New Proposal to Win Small Plants to Coal
Best Way to Run a Money-Making Railroad
Forward Steps in Recovery of Fine Coal
New Benchmarks in Coal Technology**

A PROPOSAL TO ESTABLISH a fuel and equipment consulting service for small steam plants and an explanation of maximum operating efficiency for a railroad using coal-burning steam locomotives exclusively captured the spotlight at the 14th Annual Conference of the Coal Division, AIME, and Fuels Division, ASME, held at Roanoke, Va., Oct. 11-12.

The more than 200 representatives of the coal industry and affiliated industries and institutions also heard papers on treatment of fine sizes of coal, coal storage, coking-analysis and moisture-control techniques, air pollution and engineering services. In addition, they witnessed presentation of the annual Percy Nicholls Award to Albert R. Mumford, research engineer, Combustion Engineering-Superheater, Inc., New York City, at the annual banquet.

The following AIME and ASME members presided at the six sessions: Thursday morning—Orville R. Lyons, Republic Steel Corp., and D. R. Mitchell, Pennsylvania State College; luncheon, C. E. Miller, Combustion Engineering-Superheater, Inc.; Thursday afternoon, J. E. Tobey, Appalachian Coals, Inc.; banquet, C. A. Garner, Jeddo-Highland Coal Co., and

INDUSTRY MEETING —A Special Coal Age Staff-Written Report

F. K. Prosser, N. & W. Ry.; Friday morning, A. C. Richardson, Battelle Memorial Institute, and R. B. Textor, Textor Laboratories; Friday afternoon, J. B. Jones, Virginia Polytechnic Institute.

Operating Cyclone Thickeners

The cyclone thickener has many advantages over conventional clarifying and thickening equipment, including simplicity in design and construction, low cost, minimum maintenance, small space requirements and high capacity per unit of area, said J. P. Blair, Heyl & Patterson, Pittsburgh. Pointing out that mechanical mining produces quantities of marketable fine sizes and that stream-pollution laws as well as sound business practices make it necessary to recover these fines, he cited the increasing use of cyclone thickeners. By controlling the solids concentration of circulating water, cyclones make it possible to

operate preparation plants with closed water circuits. Desired end results can be calculated by determining the quantity and size consist of solids that must be removed to stabilize the system at the optimum level and by adjusting operations to the variables involved, such as cyclone dimensions, feed concentrations, pressures and size consist.

Citing the Warwick plant, Duquesne Light Co., Pittsburgh, Mr. Blair stated that prior to use of cyclones, 6,000 gal of circulating water per shift had to be bled to two settling ponds to hold the water solids content at a level suitable to hydroseparator operation. Over 3,000 tons per year of marketable fines was being sluiced to settling ponds and ponds had to be cleaned each year. An integrated bank of 22 3-in.-diameter cyclones was installed in 15 sq ft of floor space. The cyclones now process 250 gpm of circulating water and hold the solids concentration of the system within 15 to 18% by weight. Settling ponds are no longer needed.

Two fine-coal plants in West Virginia use 18-in.-diameter cyclones as scalpers to remove coarse solids, thus making it possible to use valves to control the quantity of circulating water fed to concentrating tables. In each plant, the cyclone is installed in the piping carrying processing water to the tables. The cyclone receives 888 gpm at 7% solids concentration and feed pressure at 28 psig. Overflow is 786 gpm; underflow, 102 gpm.

Desliming Fine Solids

Large quantities of fine coal now discarded as refuse can be recovered as a marketable product by eliminat-

(Continued on p 170)

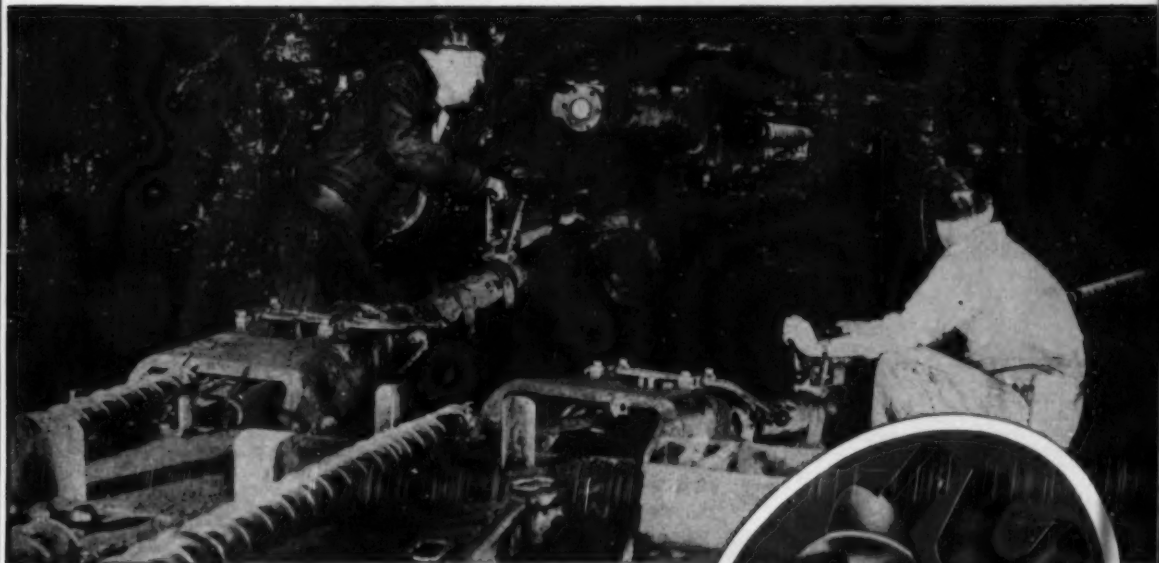
COAL MEN ON THE JOB



BLUE DIAMOND COAL CO., Leatherwood, Ky.: J. D. Snyder (left), mining engineer for all mines; Frank L. Smith, superintendent of Leatherwood mines; John Mayhew, general manager of the seven northern mines; Gordon Bonnyman, assistant general manager of mines; Ballard Taylor, chief electrician, and Harry Bryson, assistant chief electrician, Leatherwood mines.

JOY SULMET CARBIDE AUGER BITS

Save PLENTY in this mine!



JOY CD-26 Coal Drill, for trackless operations.

PLACE AND CONDITIONS: A mine in Southern Illinois. About 2' of sulphurous coal at the bottom of the seam—extremely hard to drill or cut. A bad top requires them to move in and out of a panel fast.

FORMER METHOD: Since their drill could only put in 16 holes in the bony per shift, they had to bottom cut and then drill the softer, upper part of the seam.

PRESENT METHOD: With Sulmet Auger Bits, they can put in 260 holes per shift in the bony with the same drill. Therefore, they can now cut above the hard band and shoot the bottom up.



RESULTS:

FORMER METHOD

Cutter chain life.....25,000 tons
Cutter bit cost.....\$.08 to \$.10/ton

PRESENT METHOD

Cutter chain life.....75,000 tons
Cutter bit cost.....\$.015 to \$.02/ton

This improvement is entirely due to the fact that Sulmet Bits permit high speed drilling in impurities without excessive auger bit cost.

W & D CL 3346

*Consult a
Joy
Engineer*



JOY MANUFACTURING COMPANY

GENERAL OFFICES: HENRY W. OLIVER BUILDING • PITTSBURGH 22, PA.

IN CANADA: JOY MANUFACTURING COMPANY (CANADA) LIMITED, GALT, ONTARIO

New Mine Developments

Large-scale development of various coal fields, including enlargement of existing mines and the opening of new properties, is anticipated as a result of the record-breaking coal contracts awarded by the TVA (see p 129). In the Bon Air No. 2 field, in Putnam County, Tennessee, for example, annual capacity is expected to be pushed up to over 2,000,000 tons, as compared with the 1950 output of 164,000 tons from the area. At present, there are four mines in the field, of which the Meadow Creek Coal Co. is the only one with rail connections. It is expected that the Tennessee Central will extend its lines to serve the other three, the A.B.C. Coal Co., Central Coal Co., and Fentress Coal Co. The Meadow Creek mine is scheduled to develop to a capacity of 300,000 tons.

Also as a part of the picture, the West Kentucky field, which recorded the industry's greatest development during the past 10 yr, apparently is on the verge of another period of rapid progress. The recently announced Paradise Collieries, a subsidiary of the West Virginia Coal & Coke Corp., is expected to be producing 1 million tons annually from stripping by 1953 (*Coal Age*, October, p 134). Two other mines reportedly now in the planning stages for production in 1953 by operating subsidiaries of the Nashville Coal Co. include one at Clay, Webster County, which will have an annual capacity of 1 million tons from deep and strip mining of the No. 9 seam and will be served by the Illinois Central and the L&N. The second, at Uniontown, Union County, Ky., will be a deep mine planned for a yearly output of 1,500,000 tons from the Nos. 9 and 11 seams. It will be served by the Illinois Central and also will ship via the Ohio River. Still another mine, or perhaps two, with a total capacity of 2 million tons, is understood to be in the preliminary discussion stage.

Sale of its five commercial coal mining properties in Utah and Colorado by the Kaiser Steel Corp. was anticipated last month with the announcement that a 90-day option for their purchase had been secured by James L. White, Salt Lake City attorney, and a group of associates. Kaiser Steel's coking-coal properties at Sunnyside, Utah, are not involved. According to Mr. White, the Clear Creek and Castle-gate, Utah, mines "will be sold to a leading Utah coal company," and from other sources it was indicated that they are being offered to the Independent Coal & Coke Co. Plans for the disposition of the three Colorado mines were not reported. The five mines were acquired by Kaiser Steel in April, 1950, when it purchased the Utah Fuel Co. at auction.

The U.S. Steel Co.'s Frick Division

is planning a stripping at York Run, German Township, Fayette County, Pa., and reportedly has asked tenants of 100 homes in the area to vacate them by Nov. 30 so that the buildings can be dismantled. Some 1 million tons of high-grade Connellsville coal will be recovered, most of which will go to York Run coke ovens nearby.

The Peabody Coal Co. last month announced details of its new No. 11 slope mine near Taylorville, Ill., one of the properties being developed to supply the Commonwealth Edison Co. The mine is being planned for a daily capacity of 13,200 tons and will employ 700 men. It will be completely mechanized, with continuous mining machines and belt haulage. The company is reported to have a reserve of 100 million tons in the 18,000-acre area to be mined. The mine will be served by a line to be built by the Wabash R. R. Earlier in September, Peabody announced the closing of its Mine No. 59, Springfield, Ill. In continuous operation since 1906, the mine was reported to be a high-cost operation.

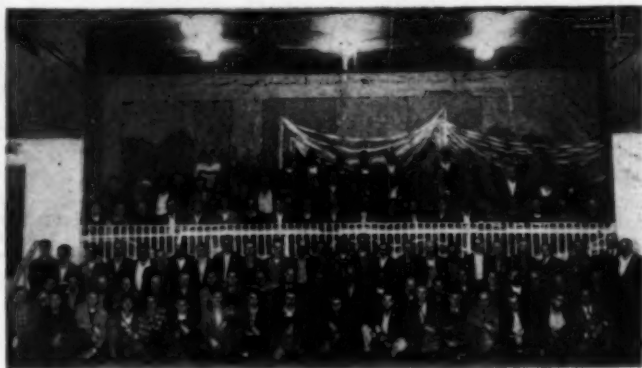
The Alabama Power Co. is developing a new opening at its Gorgas mine to be known as the Americas No. 4 mine. The new opening will penetrate some 17 million recoverable tons of

American seam coal and is expected to be producing an average of 1,000 tons daily by Jan. 1.

The Somerset Coal Corp., which operates six strip mines in Somerset County, Pennsylvania, has purchased three deep mines near Coshocton, Ohio, according to an announcement by George W. Pennington, Kittanning, Pa., president. The properties, which will be operated as the Columbus Coal & Mining Co., include the Barnes Coal & Mining Co., Warwick Coal & Mining Co. and Columbus Coal & Mining Co. The three mines' present output of 1,200 tons daily will be increased to 2,000 tons.

Western Carbon, Inc., has begun development of an anthracite field 80 mi east of Bellingham, Wash., and is building a 5-mi haulage road from its property to the railroad at Glacier. The company, which has been incorporated for \$500,000, with headquarters at Bellingham, is headed by Richard E. Randall, president, W. E. Delford, vice president, and Sam J. Spratt, secretary-treasurer.

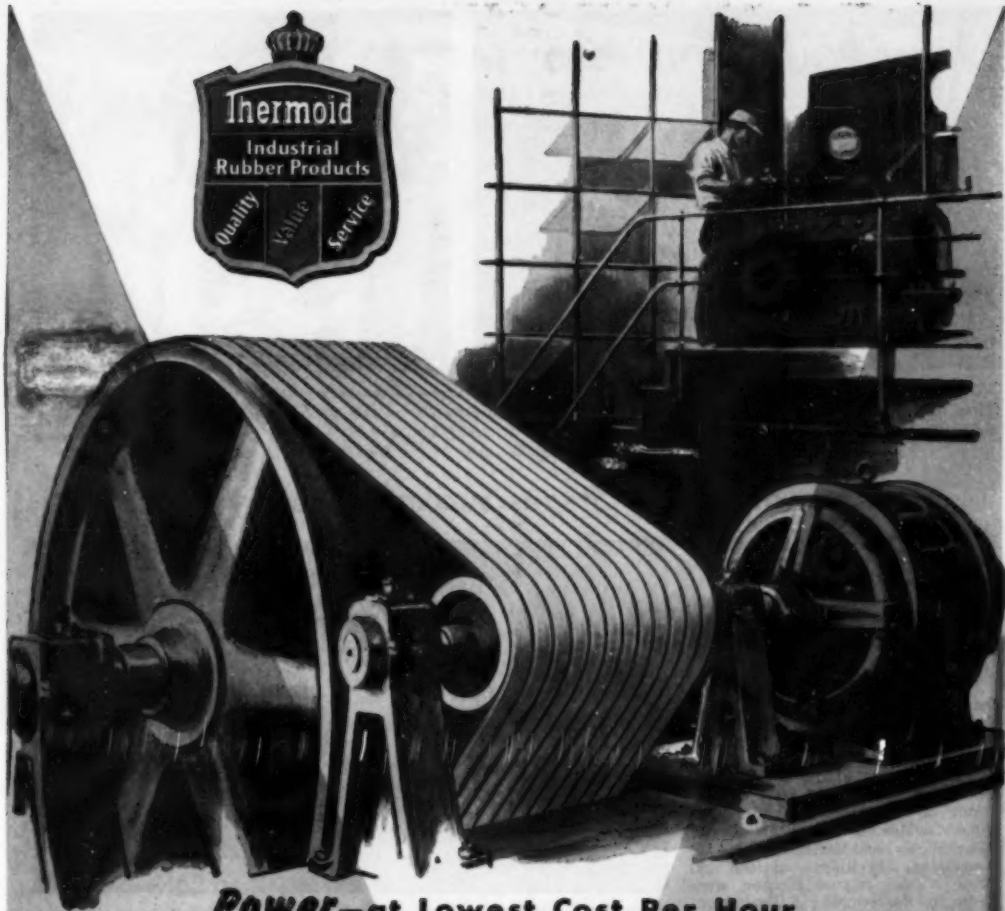
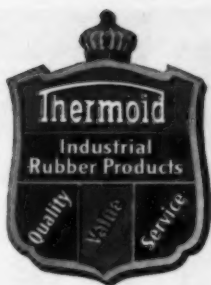
Some \$300,000 in financing reportedly was completed last month by the newly formed Ohio River Collieries Co., Columbus, Ohio, which has a 10-yr contract to supply 480,000 tons of coal annually to the Philip Sporn plant of the Ohio Power Co. The capital will be used for strip-mine development of some 4,000 acres of coal lands in Gallia County the company has under lease or option. Coal is to be transported by barge from Cheshire,



Washington Mines Join in Accident Prevention

OFFICIALS AND EMPLOYEES of Mines Nos. 3 and 9 and the cleaning plant of the Northwestern Improvement Co., and the Patrick mine of the Roslyn-Cascade Coal Co., shown at the initial meeting inaugurating an accident-prevention course sponsored by the USBM at Roslyn, Wash. The successful course, which was completed by some 65 men, was promoted in cooperation with the local safety committees, UMWA and company officials and state mine inspectors. The meeting was opened by Dee Zim-

merman, federal inspector, who introduced the following speakers: Sam Nicholls, president, District 10, UMWA; Harry Patrick, president, Roslyn-Cascade Coal Co.; Frank Badda, general superintendent, and C. R. Rushton, safety engineer, Northwestern Improvement Co.; W. J. Evans, Washington chief coal-mine inspector; L. H. McGuire, chief, Accident Prevention and Health Div., Region II, USBM; and E. L. Christensen, federal inspector, who served as instructor for the course.



**Power—at Lowest Cost Per Hour
with Thermoid Multi-V Belts**

Thermoid Multi-V Belts are pre-stretched to insure maximum power transmission without adjustment. They are constructed for flexibility and ability to absorb repeated shock loads ... thoroughly impregnated with special rubber compounds to withstand moisture and abrasion, resulting in longer belt life.

Thermoid Multi-V Belts are available in matched sets—uniform in size and cross section. Their longer life and non-slip performance add up to "Power—at the lowest cost per hour."

Your Thermoid Distributor can help you with your power belting problems—whether you need Multi-V, F.H.P. or flat transmission belts. For unusual belt problems, a Thermoid Field Representative is always available to give you the benefit of his experience.

Thermoid

Conveyor & Elevator Belting • Transmission Belting
Flat & Multiple V-Belts • Wrapped & Molded Hose

Rubber Sheet Packings • Molded Products
Industrial Brake Linings and Friction Materials

Thermoid Company • Offices & Factories: Trenton, N. J., Nephi, Utah



FIRST-AID WINNERS in their divisions at the annual safety day of the Kanawha Valley Mining Institute were teams from the Semet Solvay Div., Allied Chemical & Dye Corp., Longacre, W. Va. (left), and the Carbon Fuel Co., Carbon, W. Va. Shown at the right of their respective teams are C. V. Hunt, superintendent of the Semet Solvay Div., and H. A. Jones, general superintendent, Carbon Fuel Co. At the left is Arch J. Alexander, chief, W. Va. Department of Mines.

Kanawha Valley Stages Successful Safety Day

MINE SAFETY was the drawing card that crowded Montgomery, W. Va., from morning until late at night, Saturday, Sept. 29, as the Kanawha Valley Mining Institute staged its safety day and accompanying entertainment on the West Virginia Tech campus.

Winners of the first-aid contest in the white division was the team of the Semet Solvay Div., Allied Chemical & Dye Corp., Longacre, W. Va. Placing first in the colored men's competition was a team of the Carbon Fuel Co. Second and third (white) went to teams of the Electro Metallurgical Div., Carbide & Chemicals Corp., Alloy, W. Va., and Eastern Gas & Fuel Associates, Elk Ridge. Second and third in the colored division were taken by Eastern Gas & Fuel Associates, Powellton, and Semet Solvay Div., Allied Chemical & Dye Corp. Individual prizes to team members consisted of \$50 each for the first-place teams, \$25 for second and \$20 for third. A bronze plaque to the winning white team and a cup to the first colored team were awarded by the Mine Safety Appliances Co.

Providing attractions for all the family, the day's program began with an aerial act at 11:30 am, followed by a street parade, address of welcome, the first-aid contest and a stage show at 2:30. After a dinner for officials and guests, the aerial act and stage



AMONG THE OFFICERS AND GUESTS at the Kanawha Valley safety day were: Lee M. Morris (left), director, manpower section, DSFA, and institute secretary; C. S. Kump, Elkins, W. Va.; P. O. Hamer, consulting engineer and institute president; E. E. Quenon, USBM, Mt. Hope; Robert M. Lambie, Mine Safety Appliances Co.; Arch J. Alexander, chief, W. Va. Department of Mines; C. L. Milligan, inspector-at-large, W. Va. Department of Mines; Ruth Meadows, institute vice president; G. R. Spindler, director, W. Va. School of Mines; and Joe F. Burdette, president, W. Va. State Board of Control.

show were repeated in the evening. A prize drawing for contributors to the Safety Day fun featured 15 valuable prizes, including awarding of two automobiles.

Joe Mulligan, safety inspector, Semet Solvay Div., directed the meet.

Short addresses were made by P. O. Hamer, consulting mining engineer and president of the Institute; E. E. Quenon, chief, Mt. Hope Branch, Accident & Health Div., USBM; and Arch J. Alexander, chief, W. Va. Department of Mines.

Ohio, via the Ohio River to the Sporn plant. President of the new organization is Allen M. Rowe, president of the Cardinal Fuel & Supply Co. and the Cardinal Sewell Mining Co. John Caughell, owner of the Caughell Mining Co., is vice president and George W. Leonard, vice president and general manager of Cardinal Fuel & Supply, is general manager and secretary of the Ohio River Collieries. Actual

mining operations will be under the supervision of Ferdinand A. Howe, Walter W. Webb, F. S. Barnett and Ray L. Fleming.

Purchase of the 10½-mi West Virginia Northern R. R. Co. and some 23,000 acres of coal land in the Grant and Pleasant districts of Preston County, West Virginia, from the James Jenkins Sr. family of King-

wood, W. Va., was reported last month. The purchase, reportedly involving more than \$1 million, was made by Walter B. Saul and Charles R. Roberts, of Philadelphia, and W. L. Sherman, of Pittsburgh.

The Minerals Development Corp., Salt Lake City, headed by Claude P. Heiner, formerly with the Utah Fuel Co., is reportedly planning develop-



How to keep loaders loading

OPERATORS of this midwest mine found that transmission maintenance resulted in excessive downtime on their six Joy loaders . . . until a Standard Oil lubrication specialist recommended SUPERLA Mine Lubricant No. 4. A test on one loader was so successful that the lubricant was adopted for all six of the units.

Now, after three years of operation with SUPERLA Mine Lubricant No. 4, there has been no downtime because of scored clutch plates or faulty lubrication. Because SUPERLA Mine Lubricant No. 4 pours readily from the barrel at normal mine temperatures and is handled without difficulty by grease pumps, operators have found it particularly easy to apply.

To keep loaders loading in your own mine, and to keep all of your equipment

SUPERLA

REG. U. S. PAT. OFF.

Mine Lubricant No. 4

operating effectively through trouble-free lubrication, depend on Standard Oil products. There is a Standard Oil lubrication specialist located near your mine whose services are yours for the asking. Call your local Standard Oil Company (Indiana) office or write: Standard Oil Company, 910 So. Michigan Avenue, Chicago 80, Illinois.

What's your problem?



J. A. Grieve, lubrication specialist at Standard Oil's Decatur office, helped this midwest mine make important savings with SUPERLA Mine Lubricant No. 4. He was close at hand, able to give mine operators the kind of service they needed when they needed it.

There's a corps of such lubrication specialists throughout the Midwest, one of whom is located near your own mine. Through special training, plus a background of practical experience, this man has a knowledge of lubrication that can mean real savings to you. To obtain his services, simply contact the nearest Standard Oil office. Discuss with him the savings you can make with such outstanding products as:

STANOL Industrial Oils—Here's one line of oils that provides cleaner operation of loader and crane hydraulic units; supplies effective lubrication in compressors, gear cases, and circulating systems. One or two grades can replace a wide variety of special oils and lubricants.

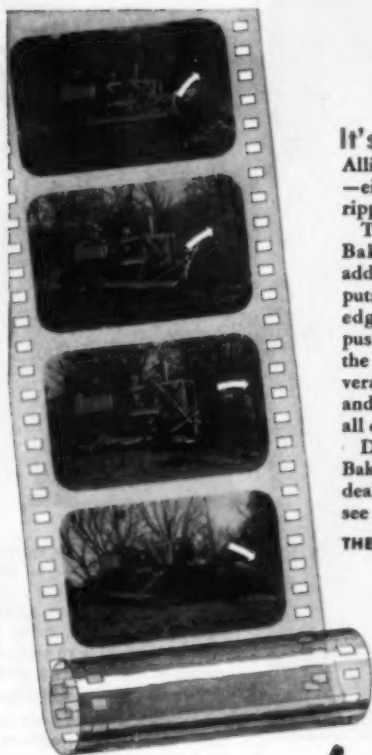
CALUMET Viscous Lubricants—On open gears and wire ropes, these greases strongly resist washing and throw-off. Their superior wetting ability affords better coating of gears and better internal lubrication of wire ropes.

STANDARD OIL COMPANY

STANDARD

(Indiana)





It's easy dozing with Baker, Allis-Chalmers matched equipment—either for dozing, gradebuilding or ripping roots and rocks.

The "move-more-dirt" curve of Baker's famous involute blades, added to the design feature which puts the tractor weight on the cutting edge, leaves maximum power for push. These Baker features help make the Baker, A-C team the most maneuverable—the most easily operated, and thus by far the most *productive* of all earth moving equipment.

Don't settle for anything less than Baker, A-C! See your Baker, A-C dealer. Get on the bandwagon and see for yourself—

THE BAKER MANUFACTURING CO.
Springfield, Illinois

Wherever you see the Baker, A-C team at work, you see action like that pictured above, in photos of a conservation job near Lanark, Illinois. It's an Allis-Chalmers HD-9 with Baker Bulldozer.

Thar she rolls!



P. S. Have you seen the new 9-X no push beam dozer?

EQUIPMENT APPROVALS

Seven approvals of permissible equipment were issued by the U. S. Bureau of Mines in September, as follows:

Jeffrey Mfg. Co.—Type 76-B Col-mol mining machine; three 70-hp motors, 250 v, DC; Approval 2-808; Sept. 7.

Joy Mfg. Co.—Type 4WS-2G/H water spray; one 5-hp motor, 220 and 440 v, AC; Approvals 2-809 and 2-809A; Sept. 11.

Worthington Pump & Machinery Corp.—Types 1-CN-52 and 1-CCN-62 pumps; one motor on each, 3 and 7½ hp, respectively, 250 v, DC; Approval 2-810; Sept. 13.

Long Super Mine Car Co., Inc.—Type 25-hp conveyor power unit; one 25-hp motor, 250 v, DC; Approval 2-811; Sept. 20.

Albert & J. W. Anderson Mfg. Co.—Distribution box; 220, 440 and 550 v, AC; Approvals 2-812 and 2-812A; Sept. 21.

Joy Mfg. Co.—Type 11BU-108E/F loading machine; one 75- and one 4-hp motor, 250 and 500 v, DC; Approvals 2-813 and 2-813A; Sept. 24.

Joy Mfg. Co.—Type 60E12 diesel-electric shuttle car; Approval 2401 (the first diesel-driven equipment approved under provision of Schedule 24); Sept. 6.

ment of a coking-coal property on a 480-acre coal tract leased from the state in Carbon County, Utah. Herbert E. Snow is vice president of the company and Reed H. Holt is secretary.

Osborne Mining Co., Corbin, Ky., reportedly is developing a 1,500-tpd strip mine in Whitley County, Kentucky. Clifford Osborne is president of the firm, which will mine the Jellico seam and ship via the L&N. Love & Amos Coal Co. will act as sales agents.

The New Pacific Coal & Oil, Ltd., is setting up a new townsite at Bryan, Alberta, which includes 64 homes, a community center and other buildings and a 500-kw power plant. The company is reportedly investing \$1 million and has so far proved 400,000 tons of coal recoverable by striping. Its development slope for an underground operation of 300 to 400 tons daily is about half completed.

The Bell & Zoller Coal & Mining Co. has announced that it has permanently closed its Jefferson No. 20 mine, Nason, Ill., effective Sept. 30. The large acreage of high-quality coal in the property will be held as a reserve, the company decided, since No. 20 was sunk 30 yr ago and it was not considered practical to rehabilitate the present mine.



Franklin County Coal
Corporation finds

Thinner belt reinforced with "Cordura" rayon takes 11,000-pound tension, trains better

Hauls 300 tons an hour. Traveling 450 feet a minute up a 15° slope, this "Cordura" rayon reinforced belt (above) operates under total tension as high as 11,096 pounds. The belt is 890 feet between centers, lifts its big load 227 feet. To make starting easier, drive motor is fluid-coupled.

The big capacity belt is protected at loading point (below) by six rubber impact idlers under the surge bin.



Whether empty or fully loaded, this 36-inch slope belt at the Franklin County Coal Corporation Mine, Royallton, Ill., troughs well under heavy operating tension. It was manufactured by the Manhattan Rubber Division of Raybestos-Manhattan, Inc., on a 3-ply cord carcass made of Du Pont Cordura* High Tenacity Rayon.

Why does a belt reinforced with "Cordura" trough better? Because "Cordura" rayon yarn is inherently stronger than yarn of natural fibers—so the reinforcing fabric can be thinner . . . of fewer plies . . . yet stronger. The resulting belt is thinner and therefore more flexible. Naturally it troughs better, has less tendency to crack and separate. And the low stretch of "Cordura" rayon saves expensive shut-downs for take-up and resplicing.

Slope conveyors are not the only installations on which such belts are better. "Cordura" rayon also gives mother belts strength and stretch resistance to operate over greater distance . . . often eliminating costly transfer points.

Before you order your next conveyor belt, inquire about the advantages of belts reinforced with "Cordura" High Tenacity Rayon. We'll be glad to send you names of suppliers . . . also complete information about "Cordura" in a new booklet "Sinews for Industry." For your free copy write: Rayon Division, Room 4421, E. I. du Pont de Nemours & Co. (Inc.), Wilmington 98, Delaware.

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Du Pont "Cordura" High Tenacity Rayon
STRENGTH AT LOW COST



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VICTAULIC...

Superior Piping for 27 Years

The Victaulic Method is the complete piping method. The name Victaulic stands for pioneered leadership in quick, dependable piping construction.

Here are the facts — just what the Victaulic Method is... why it's the EASIEST WAY TO MAKE ENDS MEET —

First — it's simple and fast — combines ease of application and ease of assembly.

Second — it's flexible and sure — can be used for irregular laying contours, yet it assures positive-locked, leak-proof joints even under extreme pressure, vacuum, or strain conditions.

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Fourth — easy-to-use, portable Vic-Groove tools prepare pipe ends twice as fast and with half the effort of a conventional pipe threader.

Try the Victaulic Method on your next piping job — new construction, repairs, or alterations — you'll be sure to save time, work, and money!

Make that next job ALL VICTAULIC! Write today for Victaulic Catalog and Engineering Manual No. 44-8A.

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COMBINED MAIN OFFICE AND
PLANT ADDRESS BELOW —**

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27TH VICTAULIC YEAR

The easiest way to make ends meet

VICTAULIC

PIPE COUPLINGS AND FITTINGS

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COMING MEETINGS

West Virginia Coal Mining Institute: fall meeting, Nov. 9-10, Summit Hotel, Uniontown, Pa.

Harlan County Coal Operators' Association: annual meeting, Nov. 14 (tentatively), Harlan, Ky.

Kentucky Mining Institute: annual meeting, Nov. 15-16, Lexington, Ky.

Hazard Coal Operators' Association: annual meeting, Nov. 23, Lafayette Hotel, Lexington, Ky.

Pocahontas Electrical & Mechanical Institute: Nov. 26, Bluefield, W. Va.

ASME: annual meeting, Nov. 26-30, Chalfonte-Haddon Hall Hotel, Atlantic City, N. J.

Coal Mining Institute of America: 45th annual meeting, Dec. 13-14, William Penn Hotel, Pittsburgh, Pa.

The Mountain View No. 2 mine of the Mountain View Coal Co., has been purchased by the Leckrone Coal & Coke Co., McClellandtown, Pa., and is now being operated as the Leckrone No. 2 mine. The company's Leckrone No. 1 mine has been worked out, it was also reported.

Some 5,000 to 6,000 acres of coal land near Uhrichsville, Ohio, is being acquired by a group of Tuscarawas County businessmen headed by Robert W. Rutledge, New Philadelphia, a former coal operator. Also included in the group, which plans a deep-mine operation, are Russell E. Bennett, Earl D. Ashleman, T. E. Sensenbaur and John D. Cronier. Nearly 100 tracts of land are involved, it is reported.

Preparation Facilities

Republic Steel Corp., Sayre mine, Sayre, Ala.—Contract closed with McNally Pittsburg Mfg. Corp. for complete modernization of present metallurgical preparation; R-O-M crushed in existing equipment to 1½ x 0, which then is screened at the rate of 330 tph into 1½ x ¾ and ¾ x 0; the 1½ x ¾ raw coal is cleaned in two McNally Tromp Dense Media Baths, with clean coal and refuse dewatered, rinsed and delivered to present washed-coal and refuse bins; ¾ x 0 raw-coal fraction is distributed to 10 Deister concentrating tables for separation into clean coal, middlings and refuse, with middlings product pulverized and released in 6-cell flotation unit; new R-O-M dumping facilities consisting of new car haul,

NEWS OF YOUR ORGANIZATION is also interesting to others, so why not make it a point to inform COAL AGE of personnel changes among your staff members, mine-development plans and unusual company activities.

Wilmot Offers Largest Choice of **RIVETLESS CHAIN CONVEYOR PARTS**



**Cut "Down" Time
by depending on Wilmot
for All Replacements**

As the original manufacturers of Rivetless chain conveyors, Wilmot has been largely responsible for the many auxiliary parts that today give the equip-

ment almost limitless applications. As a result Wilmot not only stocks the largest choice of chain sizes, but also furnishes the widest range of other conveyor parts.

AS THE ORIGINATOR OF RIVETLESS CHAIN, WILMOT OFFERS A WEALTH OF PRODUCTION KNOW-HOW

Wilmot furnishes: -- Chain in pitches from 3" to 10 1/2" and working loads from 3,000 to 130,000 lbs.; of drop forged alloy or cast chrome-manganese steels. Sprockets, traction wheels, flights, take-ups, shafting, bear-

ings, casings and trough in cast iron, ductile iron, carbon or chrome-manganese steel. See how Wilmot's wealth of engineering and production know-how can solve your design and delivery problems.

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Co., Markle Bank Building

PITTSBURGH 16, PA. -- Harold S. Lusk,
3045 West Liberty Avenue

CHARLESTON 23, W. VA. -- Cross Pump
& Equipment Co., P. O. Box 889

KNOXVILLE, TENN. -- Crowell Engineer-
ing & Sales Co., 3045 Sutherland Ave.

ST. LOUIS 17, MO. -- Jack Van Horn,
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NEW YORK 38, N. Y. -- International Manufacturing & Equipment Co. (export only), 220 Broadway



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AMERICAN CYANAMID APPROVES STEARNS MAGNETIC SEPARATOR



FEATURES

- Lowered treatment cost due to highly efficient recovery
- Continuous, automatic recovery during fluctuating feed conditions
- No possibility of short circuits as air cooled magnet is suspended completely above water bath
- Test results indicate improved overflow weir action results in less media loss in overflow discharge
- Action of separator is visible to operator at all times
- Simplified operation
- Shipped complete, ready to install. No additional feeders or extensive piping necessary

AFTER completely satisfactory performance at the American Zinc Company plant at Mascot, Tenn., The American Cyanamid Company, as technical representative of the American Zinc, Lead & Smelting Company, has approved the STEARNS Type "MWI" Magnetic Separator for use in Heavy-Media plants. In operation in the Heavy-Media process in the concentrating of zinc ores, the STEARNS Type "MWI" Separator recovered better than 99.9% of the magnetic ferrosilicon.

The STEARNS Type "MWI" Magnetic Separator is equally adaptable for the recovery of media in Heavy-Media plants for the processing of all types of ores. This includes iron ores, fluor spar, rock products, coal, and similar materials. Specialized STEARNS Magnetic Separators are available for the recovery of other media such as magnetite.

Whether your problem is that of purification, reclamation, or concentration, STEARNS has a separator for you. From the fairly simple job of tramp iron removal to the concentration and beneficiation of complex ores, STEARNS has EXPERIENCE ENGINEERED equipment to meet your specifications.

Complete laboratory research facilities are available for thorough investigation of your separation problem. This includes a complete analysis of the practicability of applying magnetic separation, the testing of sample material, and the recommendation of specific magnetic separation equipment.



Foremost in the Magnetic Field
STEARNS MAGNETIC INC.

automatic weighing, McNally Pittsburg all-steel rotary mine-car dumper; capacity, 425 tph.

Emerald Coal & Coke Co., Emerald mine, Clarksville, Pa.—Contract closed with McNally Pittsburg Mfg. Corp. for 700-tph cleaning-plant addition to present raw-coal preparation facilities; R-O-M crushed to minus 5-in and cleaned in two McNally Mogul automatic washers; middlings from Mogul washer to be crushed to minus 1½ and delivered to McNally Norton automatic rewasher for final separation into clean coal and refuse; finished washed coal classified into 5 x 3, 3 x 2, 2 x 1½ and 1½ x ¾; ¾ x 0 de-watered in five McNally Carpenter centrifugal driers; all minus 48-mesh to be thickened in cyclone thickeners prior to vacuum filtering closing the water circuit.

Delta Collieries Co., Delta mine, Delta, Ill.—Contract closed with McNally Pittsburg Mfg. Co. for 300-tph thermal-drying addition to existing cleaning plant to dry 1½ x ¾ in one 7525 McNally Vissac Down Draft drier and ¾-in x 10-mesh in two similar units; complete with McNally Reintjes furnace, wet- and dried-coal conveying equipment.

Morea Mining Co., Morea, Pa.—Contract closed with Wilmot Engineering Co. for one 2½-ft-diameter Hydro-tator for No. 4 coal; feed capacity, 12 tph.

Penag Coal Co., Shamokin, Pa.—Contract closed with Wilmot Engineering Co. for two Type D jigs for stove and nut coal; total feed capacity, 80 tph.

Miners Coal Co., Fies mine, Fies, Ky.—Contract closed with Deister Machine Co. for eight Deister coal-washing tables equipped with latest-type Lifetime anti-friction ball-bearing headmotions to treat ¾ x 0; addition to present facilities to clean 100 tph.

Brushy Mountain Coal Mines, Petros, Tenn.—Contract closed with the Hawthorn Engineering & Mfg. Co. for preparation equipment to treat lump, egg, stoker and carbon, including crusher, shaking and vibrating screens, picking tables, loading and storage facilities; capacity, 200 tph.

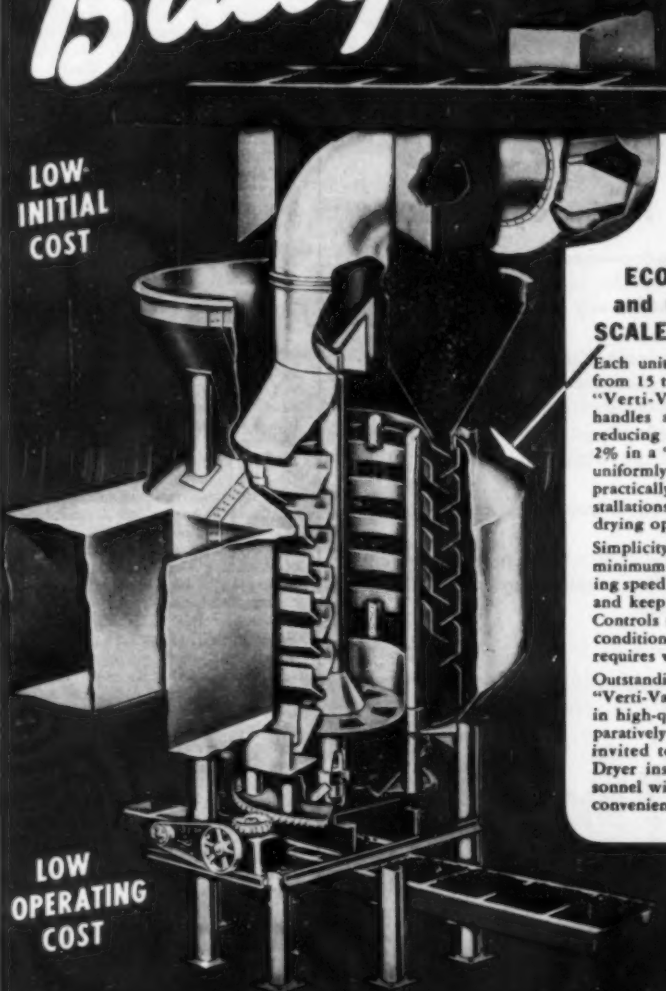
Association Activities

F. A. Fontyn, president of the Ebensburg Coal Co., was elected president of the Central Pennsylvania Coal Producers' Association and the Eastern Bituminous Coal Association at the annual meeting of the two organizations held at the Bedford Springs Hotel, Bedford, Pa., Sept. 26. Mr. Fontyn succeeded Heath S. Clark, Rochester & Pittsburgh Coal Co., who was named a vice president of the Eastern Bituminous group. Elected vice presidents of the Central Pennsylv-

THE

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**LOW
INITIAL
COST**



**LOW
OPERATING
COST**

Verti-Vane THERMAL Coal Dryer

ECONOMICAL, UNIFORM and CONTROLLED LARGE- SCALE DRYING OPERATIONS

Each unit designed for capacities ranging from 15 to 75 tons per hour, the Baughman "Verti-Vane" Thermal Dryer efficiently handles all coal sizes from $1\frac{1}{4}$ " down—reducing surface moisture to approximately 2% in a "one-pass" operation—delivering a uniformly dried and well-mixed product with practically no degradation. Multiple unit installations are recommended for large-scale drying operations.

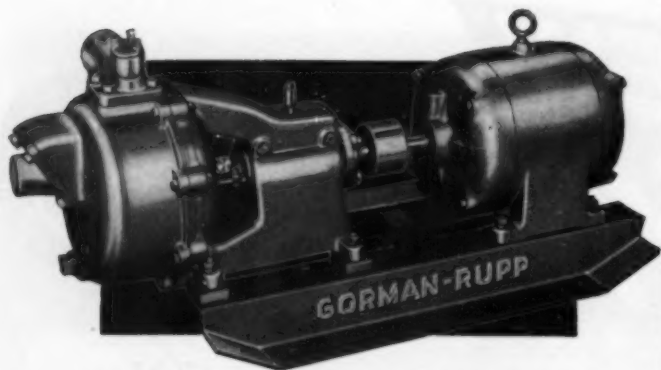
Simplicity of design, rugged construction, a minimum of moving parts, and slow operating speed tend to eliminate shift break-downs and keep replacement costs to a minimum. Controls are easily adjusted for various feed conditions so that operation of the unit requires very little attention.

Outstanding in price performance, Baughman "Verti-Vane" Thermal Dryers give the best in high-quality drying operation with comparatively low initial cost. You are cordially invited to inspect Baughman Verti-Vane Dryer installations... Robert Holmes' personnel will be pleased to escort you at your convenience. Write, wire or phone for details.

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TODAY!**

ROBT. HOLMES AND BROS., INC.

DANVILLE, ILLINOIS



GORMAN-RUPP PUMPS

SAVE MONEY in mine operations

They save in maintenance—because of their extreme simplicity of design—the impeller is the only moving part. Any wearing parts quickly and easily replaced with common tools.

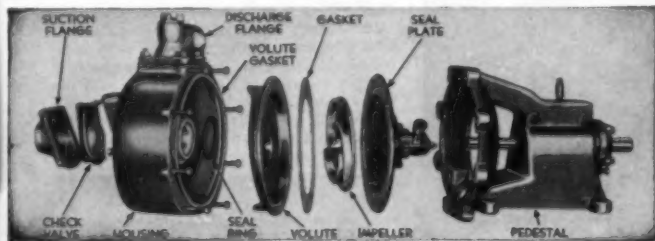
They save costly shut-down time—they will run indefinitely requiring little or no attention, are automatically self-priming—ideal for remote location and control.

They save 40% pumping costs—with the increased efficiency of the Gorman-Rupp design, 3 H.P. does what formerly required 5 H.P.

These pumps are furnished bronze fitted, and all bronze construction.

Gorman-Rupp pumps maintain nearly normal capacity under any working head. They require very low headroom and are efficient and reliable.

Write for Bulletin No. O-ME-11



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W. Va. Pump & Supply Co., Huntington, W. Va.



vania association were J. William Wetter, Rockhill Coal Co., and T. F. McCarthy, Clearfield Bituminous Coal Corp. R. T. Laing was re-elected secretary and executive director, and Walter A. Jones, treasurer, of both organizations. C. E. Miller was named traffic manager for the Eastern Bituminous group. Directors named for the two groups, in addition to the president and vice presidents, were:

Central Pennsylvania Coal Producers' Association: M. J. Ackerman, L. C. Campbell, Mr. Clark, E. M. Cortright, M. Albert Evans, G. M. Gillette, R. M. Hess, Dennis J. Keenan, John M. Kerr, John W. Krous, Archibald Miller, Ralph H. Moore, A. J. Palumbo, Richard Peale, W. H. Ritter, Joseph G. Saricks, C. M. Schwerin, Jr., Charles M. Shoffner, R. T. Todhunter, Sr., Harold B. Wickey and Walter S. Williams.

Eastern Bituminous Coal Association: Thomas Barnes, II, Charles G. Berwind, Nathan D. Cortright, Sam Light, J. W. McGinn, Ralph H. Moore, John Barnes Mull, Rembrandt Peale, Jr., Charles A. Owen, W. H. Ritter, Charles M. Shoffner, P. H. Tuttle, R. S. Walker, C. M. Watt, J. William Wetter and R. W. Wigton.

L. Newton Thomas, president, Carbon Fuel Co., Charleston, W. Va., has been appointed a member of the Mining Development Committee, Bituminous Coal Research, Inc. Mr. Thomas fills a vacancy on the 13-man committee caused by the death of R. H. Morris, of the Gauley Mountain Coal Co., this spring.

G. Don Sullivan has joined the staff of the National Coal Association in Washington, D. C. Mr. Sullivan, who formerly was assistant to the president of Ayrshire Collieries Corp., has for some months been serving as assistant chairman of the Coal Defense Committee. In his association with the NCA, he will carry on similar duties, along with other assignments.

Walter C. Gill was re-elected president of the Coal Producers' Association of Illinois at the group's annual meeting in Springfield Oct. 9. Lawrence Kiss was named vice president and Paul Halversleben, secretary-treasurer.

James W. George, Robertdale, Pa., was elected president of the Moshannon Coal Mining Institute and Richard E. George, of Altoona, was named a member of the board at a recent meeting of the institute.

George H. Rupp, manager of the mining department, Colorado Fuel & Iron Corp., has been elected a Class A director of Bituminous Coal Research, Inc., according to an announcement by Ralph H. Knode, NCA president.

Bituminous Coal Institute has named John H. Williamson director of its Speakers' Bureau, succeeding William C. Lynch, who is now with the FBI. Mr. Williamson comes to BCI from the book publishing field and also has a background of sales promotion and teaching.

Mobilizing Mine Equipment

THE URGENT CALL is for more mine output. It's demanding optimum capacity from every piece of equipment, with downtime cut by more efficient maintenance. This new pressure for production has turned many additional operators and operating men to Cities Service lubricants because

1st—The complete Cities Service line affords correct lubricants to stand the gaff, in even the hardest-worked equipment.

2nd—The alert, substantial Cities Service organization merits the same complete confidence as these lubricants.

3rd—Cities Service stands ready with competent technical aid, especially capable of ironing out lubrication difficulties.

You can cut time and costs on the job; you can cut lost motion in ordering and delivery, by concentrating responsibility on Cities Service. The line is complete. The quality is always tops.

For further information about our technical aid write CITIES SERVICE OIL COMPANY, Room 195, Sixty Wall Tower, New York City 5. Or call your nearest Cities Service office.

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Measure Liner Economy In STRENGTH PER POUND



On a pound for pound basis, Armco Liner Plates cost less to carry a given load than any other type. That's because the corrugated metal design provides safe strength with no excess weight or material.

Armco Liner Plates are easy to handle and install. One man can carry, hold and bolt a section into place using only a hand wrench. Less bulk also means less excavation.

Other advantages include fire-resistance and freedom from excessive maintenance.

Use Armco Liner Plates for sloped or vertical entries, air shafts and wherever else you need the protection of a steel liner. Write for complete information. Armco Drainage & Metal Products, Inc., 3761 Curtis Street, Middletown, Ohio. Subsidiary of Armco Steel Corporation. Export: The Armco International Corporation.

ARMCO LINER PLATES



MORE SCRAP MEANS MORE STEEL • TURN YOURS IN TODAY!

News Briefs . . . From p 130

being considered as rains in the Northwest area were ending a water shortage that had caused reduction in the output of electricity and a consequent serious loss of aluminum production from the region. Meanwhile, members of the ASME were told at their fall meeting that experience indicates that the vast deposits of lignite can be utilized as a fuel by central station power plants without pre-preparation or conditioning and that over 40 high-pressure steam power-generating plants were using North Dakota lignite.

1952 Metals Allotments Threaten Coal Projects

Construction of coal-mining projects will be paralyzed early next year the National Coal Association predicted last month, in criticizing the "token allotments" of controlled materials being made available to the DSFA for the first quarter of 1952 as "so small as to border on the ridiculous." The 9,096 net tons of steel allotted to coal mining for the first quarter is 65% less than the allotment for the fourth quarter of 1951, which in turn was "little more than enough to supply only the most essential projects applied for," the NCA said. The copper allotment of 213,000 lb, a ton under the 1951 fourth quarter, is "woefully short of actual need," while the 15,000 lb of aluminum is about half of this year's final-quarter allowance. "It will be unfortunate for the country as a whole," the NCA emphasized, "if it takes a shortage of production of solid fuel to convince the defense control authorities that coal mines must have adequate supplies of materials and supplies."

Pittsburgh Consol Developing New Synthetic-Fuels Method

A new more economical method of making synthetic fuels from coal is under development by Pittsburgh Consolidation Coal Co., Joseph Pursglove Jr., vice president in charge of research, reported Oct. 21. Stating that "many years will elapse before the German war-developed processes will be truly economical in this country," Mr. Pursglove said the company had turned to a method of converting coal into a solid char while extracting liquid tar and a high-quality fuel gas. By the process developed, a char residue suitable for burning under large boilers to produce steam is produced, along with 30 to 40 gal of liquid tar and 1,000 cu ft of gas from each ton processed, he said. The cheapest German method probably produces gasoline at a cost of 20¢ a gal, he reported.

And For Your Information . . .

The mining community of Wheelwright, Ky., viewed the World Series via television this fall for the first

Cummins® Diesels do so many jobs - so much better



Shovels, cranes,
industrial locomotives



Drilling rigs, centrifugal
pumps, generator sets



Buses and
on-highway trucks



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yarders and loaders



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Work boats,
pleasure craft

Lightweight, high-speed Diesels (50-550 hp) for these and many other uses

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NOT
ONCE
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TWICE**

Rugged, lightweight, high-speed Cummins Diesels are at work everywhere. Each engine is built *twice*. It's assembled, run-in tested, disassembled and inspected, then reassembled and tested again. This extra care in building, plus Cummins exclusive fuel system and an efficient and expanding service and parts organization, means minimum "down time", more power and profits for the user. See your Cummins dealer.



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CUMMINS**

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Heavy Duty Cup Goggles



keep you on the safe side



STYLE
RR 50

**WILLSON COMFORT FEATURES
KEEP THEM IN USE**

Molded Eye Cups Fit Facial Contours • Adjustable Bridge Width for Proper Fit • Side Screens Ventilated to Minimize Fogging • Adjustable Headband—Secure Fit Without Pressure • Fitted with Super-Tough® Hardened Glass or Plas-Tough® Plastic Lenses

OTHER WILLSON HEAVY DUTY GOGGLES



• Cover-All®
over glasses



Rubber Mask
splashing liquids

See your Willson distributor or write for bulletin

WILLSON PRODUCTS, Inc., 239 Washington St., Reading, Pennsylvania

time, E. R. Price, manager of coal operations for the Inland Steel Co., recently reported. The play was carried into the company's Community Hall by a coaxial cable connected to a master antenna erected on a nearby hilltop at a 2,000-ft elevation. Townspeople now are being permitted to tap the cable and "pipe" programs into their own homes.

An explosion Oct. 15 in the Bunker mine of the Trotter Coal Co., Cassville, near Morgantown, W. Va., killed 10 men. Cause of the blast, which occurred 3½ mi underground, was thought to be a cut locomotive power cable apparently run over by a motor.

Retail coal prices went up as much as 20¢ a ton last month as the OPS Oct. 3 authorized dealers to pass on to consumers the full freight-rate increase on coal approved by the ICC Aug. 8. Actually, the rule added a maximum of only 14¢ a ton since 6¢ had previously been okayed on an interim basis last spring.

The Steelworkers union scheduled to begin wage negotiations this month is expected to demand a "substantial" wage rise that will break through the present Wage Stabilization policy and set off a new round of wage demands throughout industry. With steel already tight, the union's threat of strike if no agreement is reached by Dec. 31 is a strong bargaining factor.

Consumption of bituminous coal by public utilities is increasing hand-in-hand with the sharp rise in electric power and will exceed 100 million tons in 1951, 33% over the annual average of the past 10 yr, according to BCI estimates based on the first 8 mo of the year. Bituminous consumption by utilities in 1950 was 64% of all the fuel used.

Under a new Pennsylvania law signed by Gov. Fine, late in September, the state now has the right to obtain an injunction to enforce the Anthracite Standards Act. Both jail and cash penalties permitted for violation of the 1947 law were increased under the new act.

The Delta County (Colo.) Chamber of Commerce decided Oct. 8 to form a coal-synthesis corporation to promote the location of a coal-processing plant in the area. Work being carried on by the Chamber included a trip by two officials to New York and Washington to interest government and industry in the facilities offered by the region.

The Joy Mfg. Co. last month disclosed that it had concluded an agreement with BCR for the acquisition of certain features of the stainless-steel extensible conveyor developed by the BCR Mining Development Committee. Joy will build commercial models of a new shaker conveyor, using the best features of both the BCR and Joy designs, it was reported.

**"Tycol Acylkup 'stays put'...
keeps mine equipment rolling...
smooths the way for heavier loads"**



Absolutely right! Tycol Acylkup stays put . . . keeps mine equipment running in top condition — inside the mine and out.

Tycol Acylkup reduces low-temperature drag . . . retards lubricant leakage at high temperatures . . . permits the handling of more cars per haul.

Tycol Acylkup is firmly resistant to the washing action of water. Its dependable lubricating ability reduces maintenance costs.

Your nearest Tide Water Associated office will give you further information. Call or write today.



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Wedge Type Tigerweld Bond

- No welding
- Use it over and over
- For temporary
or permanent trackage



Drill a hole, insert the wedge and pound it home. That's all you have to do to get permanent, low-resistance joints when you use the Wedge Type Tigerweld Rail Bond.

To remove the bond—and re-use it—just knock the wedge out from the other side. The bond comes off easily. With just ordinary care, the Wedge Type Tigerweld Bond can be re-used indefinitely. And many mines use it for permanent trackage as well.

For more information on these long-life, trouble-free Tigerweld Bonds, write American Steel & Wire Company, Rockefeller Building, Cleveland 13, Ohio.

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UNITED STATES STEEL EXPORT COMPANY, NEW YORK

DRILL THE HOLE

INSERT THE WEDGE

POUND IT HOME

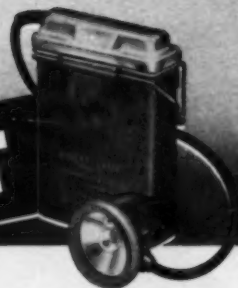


American Tigerweld Rail Bonds

UNITED STATES STEEL

the trend is to

WHEAT



What to Look for **IN SELECTING A MODERN ELECTRIC CAP LAMP**

(One of a series of informative advertisements on Better Light for the Miner)

✓ **FULL-SHIFT ILLUMINATION**

A most important point to check! Light levels which lower appreciably during the shift defeat the purpose of better illumination, cut production and increase operator fatigue.

Wheat lamps maintain a very high percentage of initial light efficiency right through the end of the shift.

✓ **LIGHT OUTPUT AND WEIGHT**

Large battery capacity, permitting a high amperage bulb, is a most desirable feature. It should not carry a penalty of excessive battery weight.

Wheat lamps deliver high light output without bulky battery size or cumbersome weight, through space-saving flat positive tubes. The standard "Forty-Niner" weighs only 80 ounces.

✓ **MODELS FOR EVERY NEED**

A single model lamp may be right for some mining jobs, yet too large or too small for others. You benefit where model choice exists.

Wheat lamps are available in three models: the standard "Forty-Niner" for regular duty, the "M" for machine men requiring greater, more intensive illumination, and the "Q" where extremely light weight and smaller size is desirable. Each model charges from the same rack, is capable of good continuous full-shift performance, and admirably suited for its particular field of application.

✓ **FULLY AUTOMATIC CHARGING**

Low-cost lamp service is affected strongly by lamphouse arrangements for charging and distribution. True automatic charging is vitally essential!

Wheat lamps provide the only genuinely automatic charging. Miners place their own lamps on charge, more quickly than turning them in to an attendant—and each lamp takes the amount of current necessary to re-charge it—and no more; the rising counter voltage of the battery gradually reducing the current supplied. All this is done automatically without manual attention.

**National Mine
Service Company**



Has the Facilities—Delivers the Goods

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FLEETMASTER TRUCK TIRES

*Job-Fitted For Your
On-and-Off-the-Road Service*

Specialized Treads!

Now for the first time, truck operators can have a tire that meets the most severe demands of *specialized on-and-off-the-road* tire work—the U. S. Royal Fleetmaster! It's specially designed and compounded to give *sharp penetration* and *super traction off the road PLUS smooth-rolling, non-skid mileage* when you pull up *onto the highway!*

These are the Fleetmaster Facts!

- ★ 70% deeper traction tread!
- ★ Tougher, stronger carcass! (More Recaps)
- ★ Job-fitted tread compounds!
- ★ Thicker under-tread!
- ★ Round-molded to the tire's inflated shape to reduce distortion stress and strain!

See the new Fleetmaster at your nearest U. S. Royal Dealer. **A phone call does it.** He's listed in the Classified Telephone Book.

UNITED STATES RUBBER COMPANY

Among the Manufacturers

Robert C. Becherer has been elected executive vice president of Link-Belt Co., Chicago. Mr. Becherer, who was elected vice president last March, joined Link-Belt in 1923 upon graduation from Purdue University and had been general manager of the company's Ewart plant in Indianapolis since 1947. Richard E. Whinrey, assistant general manager at the Ewart plant, has been appointed general manager to succeed Mr. Becherer.

Wilmot Engineering Co., Hazleton, Pa., has established an engineering and sales division devoted to its Keystone rivetless chain and along with a regrouping of the engineering staff has appointed the following district sales representatives: Harold C. Lusk, Pittsburgh 16; Cross Pump & Equipment Co., Charleston 23, W. Va.; Crowell Engineering & Sales Co., Knoxville; Jack Van Horn, St. Louis 17; Amos A. Culp, Birmingham 4, Ala.; and International Mfg. & Equipment Co., New York 38. The new division followed an extensive program of rearrangement of the firm's foundry, machine shop and pattern-making facilities at White Haven, Pa., according to George L. Wilmot, president. General sales management of Wilmot is headed by Harold R. Middleton, and Carl S. Jenkins is chief of the engineering department.

The Westinghouse Electric Corp. will undertake a \$296,000,000 expansion program extending beyond 1953, Gwilym A. Price, president, recently announced. The expansion will be the second such program undertaken since the end of World War II. The first was completed in 1948 at a cost of approximately \$150,000,000 and increased manufacturing facilities by 50%. The electrical industry, although one of the oldest in the United States, has shown its greatest growth in the past 10 yr, Mr. Price observed. In the years 1948 to 1950, he added, Westinghouse sales and net income exceeded even wartime peaks and were more than 500% of the 1938-39 rate, while sales during the first 6 mo of 1951 were at a higher rate than during the corresponding period of 1950. The new expansion program is expected to further increase productive capacity by 50%.

Combining the electrical and mechanical power departments of Allis-Chalmers Mfg. Co. into a power department under the management of R. M. Casper has been announced by J. L. Singleton, vice president of the company's general machinery division. Mr. Casper, manager of the A-C electrical department since 1949, joined the company in 1936 as a sales representative in Detroit. New power department appointments include F. W.

Bush, assistant manager in charge of the electrical sections; C. C. Jordan, assistant manager in charge of the mechanical sections; R. N. Miers, manager of the steam turbine section; and C. R. Braun, assistant to Mr. Casper. As part of the organizational change, the centrifugal pump department becomes a section of the power department under the management of H. P. Binder, a post he has held since 1942.

The formation of six new operating divisions has been announced by the General Electric Co., along with the appointment of general managers for each. Glenn B. Warren heads the Turbine Div. and James M. Crawford the Motor and Generator Div., both with headquarters at Schenectady, N. Y. Francis E. Fairman, Jr., is general manager of the Transformer and Allied Products Div., Pittsfield, Mass. The Measurements and Industrial Products Div. is in charge of Harold E. Strong, Lynn, Mass.; the Switchgear and Control Div., Philadelphia, is under George E. Burens; and the Component Products Div., Ft. Wayne, Ind., is headed by William C. Wichman. Together with the recently announced Defense Products Div., the



JOHNSONITE
PLASTIC PIPE
MADE IN U.S.A.

JOHNSONITE has found a natural use in mines for a lot of reasons, but its easy installation is one BIG reason why it is being used so extensively.

Flexibility of Johnsonite Plastic Pipe enables it to find its own floor, eliminating cleanup work necessary on mining jobs.

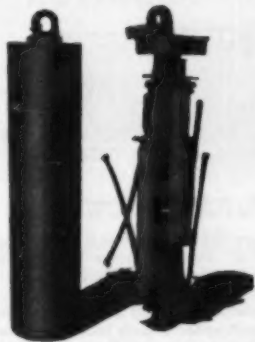
Just feed it down in, and attach it to the pump or pipeline with an adapter having standard pipe threads. The other end of the adapter is an inner sleeve which slips into the pipe.

Stainless steel clamps tighten the pipe down over the sleeve. It's easy to install also because of its light weight . . . 500 feet of Johnsonite in the 1 1/2" size weighs only 50 pounds.

Installation costs are lower than rigid pipe lines.

Johnsonite Plastic Pipe has other features worth looking into: acid and corrosion resistance; economy; 1 1/2 times less friction loss . . . our new catalog will give you complete details.

SHUTTLE CAR RESISTORS

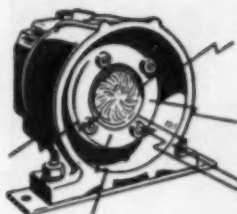


Illustrated, GUYAN replacement elements for permissible shuttle-car traction motors . . . fits in original case and mountings. Resistor available for all type shuttle car traction and reel motors.

GUYAN Try us for long-lived, trouble-free resistors.
MACHINERY COMPANY
LOGAN, WEST VIRGINIA

JOHNSON PLASTIC

BOX 268
CHAGRIN FALLS, OHIO

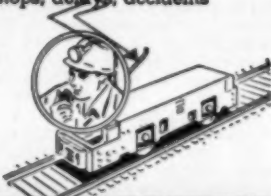


How's Your Coal Control Today?

Modern mining the Femco way—by Trolleyphone—means constant control thru foolproof communication. It means push-button supervision—instant contact with every section of the mine, whether motormen on the move, or locomen at the face. Gives quick action, quick reports. Cuts stops, delays, accidents—and costs!

"For better Coal Control—Trolleyphone!"

- Ups production
- Brings savings
- Assures safety
- for greater profits



**FARMERS ENGINEERING
AND MANUFACTURING COMPANY**

TROLLEYPHONE
"It Speaks for Itself"

Operators say—"20%
MORE EFFICIENT
than average Storage
Battery Locomotive"

FEATURES

Double knee-action; better track-ability. Floating power; less power consumption. Quick acting footbrake, essential for quick stopping, especially behind loading machines. Brake shoes that follow wheel (due to knee-action). Adjustable Timken Bearings throughout. Hushiest transmission in any storage battery locomotive. Never looks oil. Never add oil. Use regular auto oil; change every 6 months. Strong, Simple Design, low maintenance. Backed by over 25 years of experience with Storage Battery locomotives.

**MORE
HAULING
FOR LESS
STORAGE
BATTERY
CAPACITY**

THE GREENSBURG MACHINE CO.

Makers of Custom-Built Storage Battery Locomotives

101 STANTON ST., GREENSBURG, PA.

THE GREENSBURG "MONITOR"



In use by Mr. Oliver & Stanton
Coal Company, Stanton, Ill.

The Greensburg "Monitor" Type is the first real improvement in storage battery locomotives. ENTIRELY NEW IN DESIGN. Its efficiency and economy have been proved in actual mine use. Operators report 20 to 25% more coal hauled than with other battery locomotive having the same battery capacity. From 6 to 10 ton capacities: track gauges 36" to 56½". Other locomotives from 1½ tons to 10 tons, 16" to 56½" track gauge.



Desert Truck Tests Are Tough

TRUCKS ON TEST on the newly completed 7¼-mi test track of the International Harvester proving ground near Phoenix, Ariz., where testing is on a year-around basis in temperatures ranging from well below zero to 118 deg. In addition to the paved test road, the 6½ sq mi of rugged desert land contains a 4-mi rough dirt track, 11 mi of access roads and a number of special test areas. The International test fleet averages some 34,000 mi a week in experimental and production-quality testing.

six new divisions include the majority of the departments which constituted the former Large Apparatus Div. and Small Apparatus Div. John W. Belanger, Schenectady, and Nicholas M. DuChemin, New York, have been elected GE vice presidents. Concurrently, Mr. Belanger was appointed general manager of the Defense Products Div. Mr. DuChemin was recently placed in charge of the company's Manufacturing Services Div. Sam Littlejohn, formerly manager of the Atlantic district office of the company's apparatus organization in Philadelphia, has been elected a GE commercial vice president and will be engaged in customer relations activities with headquarters in Cleveland. F. Charles Ruling has been named manager of the Atlantic district of the Apparatus Sales Div., with headquarters in Philadelphia. James J. Fitzgibbon, manager of the Charleston, W. Va., office, has succeeded Mr. Ruling as manager of the G-E Apparatus sales office in Washington, D. C.

Rome Cable Corp., Rome, N. Y., has named George W. Acock product application engineer, covering the Southern and Western areas of the country. Before joining the company, Mr. Acock was chief engineer of the Electrical Wire Div., John A. Roebling Sons Co.

H. V. Hughes has been appointed manager of the Industrial Div. of Southwestern Engineering Co. Among



...never failing source of Power for Defense

The United States has maintained its stature as the world's foremost industrial nation because of its vast natural resources and far-ranging railroad distribution system. These resources include the coal which keeps our plants and factories running.

In our great periods of peaceful industrial growth and production, coal has been our gauge of power. In wartime, coal has meant basic and limitless strength... power without interruption. Today, when the free world is producing for defense of

freedom, we must credit coal as a great trick-taking trump in our arsenal. Coal, dependable and always available, is the sure-fire source of the energy necessary to limitless production.

Along the lines of the Pennsylvania Railroad are mines which produce every type of coal to meet industrial and domestic needs. These vast coal reserves on the Pennsylvania lie close to major consuming areas... a fact of importance to you when you plan for tomorrow's power.

 **PENNSYLVANIA RAILROAD** 

Safe! Dependable!

MINE TRANSPORTATION



The TJI Mine Jeep provides safer, faster underground transportation for Mine Superintendents, Engineers, Inspectors, and Maintenance Personnel to and from working faces and emergency areas. Its many applications include pulling man-trip cars, fire-fighting equipment, and conversion to ambulance duty at a moment's notice.

The Lee-Norse TJI Mine Jeep is a much-needed vehicle in your underground transportation system! Write today for details.

Now! 1/2 the Size... 1/2 the Cost



LEE-NORSE SCOOTER

A NEW, SPEEDY
MINE PERSONNEL
CARRIER

Quick, independent transportation for Mine Mechanics, Pumpers, Fire Bosses, and other maintenance personnel at one-half the cost with the Lee-Norse Scooter! Approximately one-half the size of the Mine Jeep, the Lee-Norse Scooter is rugged and simple in design, incorporating many standard Mine Jeep parts. Weight—approximately 1000 lbs.; Wheel Base—48"; Overall Length—6'-0"; available in all track gauges, 36" to 48". Headlights available at slight additional cost.

The Lee-Norse Scooter provides low-cost, run-about transportation when and where it is needed! Write today for complete information.

Lee-Norse Company
CHARLESTON, PA.

the activities included in the division are heavy industrial engineering and construction, heavy-media separation plants, and the SWECO metallurgical laboratory.

John F. Spaulding has been named sales manager, Black & Decker Mfg. Co., Towson, Md., succeeding Glen H. Treslar, recently promoted to vice president in charge of sales. Mr. Spaulding, who joined Black & Decker in 1926 as a sales engineer, has been manager of its Buffalo branch since 1931.

The General Tire & Rubber Co. has transferred the management of its mechanical goods division to the company's main offices in Akron, Ohio. Among those now making their headquarters in Akron are: Howard Dodge, general manager of the division; W. J. Gurtner, controller; T. H. Winlejohn, chief engineer; and Robert Iredell, Jr., product engineer. W. A. Wright, division sales manager, will continue to direct sales from the Wabash, Ind., office.

Formation of a new industrial sales division to develop new and specialized markets for component units of White trucks and buses has been announced by J. N. Bauman, vice president in charge of sales. Milton W. Brooks has been named sales manager of the division, which will have its headquarters at the main offices of the White Motor Co., in Cleveland. For the past 3 yr, Mr. Brooks has been a regional sales manager for Cummins Engine Co., Inc.

Timken Roller Bearing Co., Canton, Ohio, has appointed George T. Humphrey, Jr., assistant general manager of its service sales division. Mr. Humphrey, who leaves his post as assistant branch manager of the service sales division of Dallas, Texas, joined Timken in 1939.

The McNally Pittsburg Mfg. Corp., Pittsburg, Kans., has named H. R. "Dick" White advertising manager, according to C. W. Waterman, Jr., general sales manager. Mr. White, formerly with the Watts-Payne Advertising Inc., Tulsa, succeeds Jack H. Overman, recently named director of Student Union Activities of Kansas State Teachers College.

The Hendrick Mfg. Co., Carbondale, Pa., this year is celebrating its 75th anniversary. Eli E. Hendrick, founder of the company, operated an oil refinery in Carbondale in the sixties. His experiments in making metal screens for oil filter presses led to the business of perforating metal and to the establishment of the Hendrick company in 1876. Today, the Hendrick plant occupies 17 buildings, covering 6 1/2 acres, and the company produces thousands of sizes of perforated metal in hundreds of shapes and designs, besides manufacturing many other products.

Gunnar Palmgren has been elected

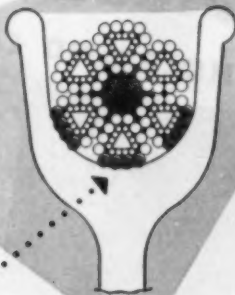
ROUND STRAND



**SPECIFY
STRONGER — SAFER
"HERCULES"
FLATTENED STRAND**

- 10% EXTRA STRENGTH
- LARGER METALLIC AREA
- SMOOTH RUNNING
- SMOOTH WEARING
- EASIER TO RIG
- EXTRA SAFETY
- EXTRA ECONOMY
- **RED-STRAND** QUALITY

FLATTENED STRAND



**SPREADS THE LOAD
FOUR WAYS**

"Hercules" Flattened Strand design spreads wear over four wires—not just one as in round strand. This compact outer surface greatly reduces wear in grooves of drums, sheaves and idlers. Tends to keep them smooth.

The triangular cross-section of the strands permits a smaller core, larger contact area between strands, and greater resistance to crushing. A smaller size Flattened Strand rope can usually be used for the same strength and safety requirements as round strand. Makes for easier rigging in tough spots.

Take advantage of the greater strength and economy of "Hercules" Flattened Strand Wire Rope.



**LESCHEN
WIRE ROPE**

Consult our Engineering Department for specific recommendations. A. LESCHEN & SONS ROPE CO., 3909 Kennerly Ave., St. Louis 12, Missouri. Distributors in all principal cities.



CUT DRILLING COSTS!!!

BLAST HOLE AND COAL RECOVERY DRILLS



• McCarthy Self-Propelled Horizontal Blast Hole Drills get in and out of tight quarters quickly; adjust on four individual leveling jacks for proper drilling heights. Excellent for low level work.



• Truck Mounted Horizontal McCarthy Drills are breaking drilling records everywhere! All necessary equipment is carried with the unit — out of the mud at working level!



• Here's a Vertical McCarthy Unit on a Half-Track. Compact construction makes McCarthy Drills perfect for all mountings... truck, half-track, cat, jumbo or other special rigs.

Heavy
Rugged
Powerful



MCCARTHY DRILLS

• If you haven't already seen a McCarthy at work, we suggest you see one quick!

These rugged, powerful units have gained universal acceptance as the most efficient machines ever made for drilling blast holes. Furnished with gasoline, electric or diesel power.

Extra heavy construction relieves you of maintenance troubles. They're versatile, fast, economical machines capable of 50% more productive service than any drill you might now be using!

Write Salem Tool today for full facts. Also ask about McCarthy Coal Recovery Drills — the machine that's being acclaimed in so many trade journals for its remarkable ability to reduce mining costs.

DRILLING EQUIPMENT SINCE 1901



THE SALEM TOOL CO.

a vice president of SKF Industries, Inc., Philadelphia. Mr. Palmgren, who will be in charge of the company's engineering and research, has been with the company for 32 yr and formerly was assistant vice president and chief engineer.

J. B. Laramy, assistant manager of the company's Chicago district office for the last 6 yr, has been appointed manager of the marketing research department, Worthington Pump & Machinery Corp., Harrison, N. J. J. T. Carroll, who joined Worthington in 1931 and for the past 3 yr has been regional distributor supervisor of the air conditioning and refrigeration division at Chicago, has replaced Mr. Laramy as assistant manager of that office.

The Chicago branch of the Howe Scale Co., Rutland, Vt., has been moved to 1915 N. Harlem Ave., Chicago 35, in a step announced by Richard F. Straw, vice president in charge of sales, that is designed to expand the company's office and service facilities in the area. Curtis B. Hoffman is manager of the branch.

A \$1,000,000 building expansion program to increase production facilities of the Detroit Diesel Engine Div. of General Motors has been announced by W. T. Crowe, general manager. The announcement highlights a production of over 50,000,000 hp in 2-cycle diesel engines attained by the division since 1938. According to Mr. Crowe, it is the eighth major expansion the division has made and adds almost 80,000 sq ft to the 1,000,000 sq ft now under cover.

Thermoid Co., Trenton, N. J., last month acquired stock control of the Essex Rubber Co., Trenton, manufacturer of rubber soles and heels for shoes and other molded products established in 1907, Fred Schuter, Thermoid president, announced. Thermoid products will be manufactured at the Essex plant as facilities warrant, he said.

Chain Belt Co., Milwaukee, has appointed the Cate Equipment Co. as its new district sales office in the Salt Lake City area. For some months, Cate Equipment has served as a distributor for Rex and Baldwin-Rex products and it will continue to maintain its distributor status and carry stocks for prompt local service from both its Salt Lake and Price, Utah, offices.

The United States Steel Corp. is distributing its Golden Anniversary Book, "Steel Serves the Nation," a 228-p volume that summarizes its accomplishments and services since its formation in 1901. In the preface, Board Chairman Irving S. Olds says: "United States Steel Corp. celebrates its Golden Anniversary this year with the satisfaction and pleasure that usually accompany the attainment of such a respectable age," pointing out

Said a duck, "Water rolls from my back,
A strange and remarkable knack—
Much the same, I agree,
As those screens by Bee-Zee,
Which dewater as quick as a quack!"



BEE-ZEE

ROUND ROD SCREENS



FREEZE-UPS

Bee-Zee's faster, better dewatering stops winter freeze-ups and makes more money for you! Water leaves coal faster through these round rod screens, giving you dry coal, easy to handle even in winter cold.

FINE POINT OF CONTACT



between round top and tie rods leaves no "pockets" to cause blinding or clogging. Washing and screening is fast and accurate . . . water is removed quickly and thoroughly, leaving coal free of excessive moisture that could cause freeze-up.

BEE-ZEE ROUND ROD DESIGN



is chief reason for long life of Bee-Zee Screens. Round top rods can wear half-way through their diameters before screen opening changes in size. Coal operators report that Bee-Zee Screens last 10, 20—even 30 times longer!

WELDED STEEL CONSTRUCTION



resists shock and abrasion. Stainless steel rods will not corrode or rust . . . built-in screen tension absorbs pounding action.

WRITE FOR FREE CATALOG



Bixby-Zimmer catalog explains all the money-making features of Bee-Zee Round Rod Screens and their use in coal processing work. Write today—no cost or obligation.



BIXBY-ZIMMER
ENGINEERING CO.

1110 ABINGDON STREET, GALESBURG, ILLINOIS

Bee-Zee Screens can be fitted to any coal processing equipment.

SYNTRON

VIBRATORY MATERIAL HANDLING EQUIPMENT



One of six Model F-45 Syntron Feeders in a coal preparation plant. Mounted on a downslope of 15°, each handles 40 TPH of minus 1/4 x 28 mesh, 30% moisture, slack coal to driers.

VIBRATING GRIZZLIES

Used in heavy tonnage coal preparation for simultaneously feeding and coarse sizing of run of mine coal in volume flow.

PICKING TABLES

Feed with a very short vibration stroke that assures higher picking efficiency with less fatigue to the pickers.

VIBRATING SCREENS

Screening material wet or dry... Used with single or multiple decks. Used to bypass fines and size the product for separate bins.



VIBRATING GRIZZLIES



PICKING TABLES



VIBRATING SCREENS

DIRECTED TO YOUR NEEDS TOP PERFORMANCE AND EFFICIENCY

Syntron Vibratory Equipment is designed with your material handling problems in mind and can be engineered to your present processing system with minimum change.

Syntron offers effective material handling thru variable control of rate of flow... from a trickling dribble to a gushing torrent... at the turn of the dial. The absence of mechanical wearing parts... gears, sprockets, cams, etc... means savings for you in low cost maintenance and replacements and in outstanding performance value.

Each Syntron product comes in a variety of models for small volume or heavy tonnage material flow.

OTHER SYNTRON PRODUCTS

ELECTRIC VIBRATORS

CONVEYOR FEEDERS

DEWATERING SCREENS

VIBRATORY FEEDERS

BATCH WEIGHING
TEST SIEVE SHAKERS

WEIGH FEEDERS

WRITE FOR
CATALOG
DATA

SYNTRON COMPANY

975 Lewistown

Homer City, Pa.

that from the beginning of operations April 1, 1901, to Jan. 1, 1951, the company produced more than 930 million tons of steel.

Gas Man Urges Coal Plants Begins on p 129

The solution could lie in a series of steps that would revolutionize the gas-distribution business and provide long-range benefits for both industrial and domestic gas users. These steps, he said, would be:

1. Construction of large gas-conversion and standby plants at strategic points along the present natural-gas pipeline system and "near our huge coal reserves."

2. Use of the conversion plants to provide storage capacity for the interchangeable standby gas. Such facilities would enable the industry to keep up with demand as natural-gas supplies are taxed by winter weather.

3. Use of excess plant capacity to produce gasoline from coal, especially during summer months when gas demand is comparatively low and gasoline requirements are high.

4. Production of oil from coal—the product to be stored in concentrated raw form for winter-peak standby demands.

5. Use of the conversion plants to make hundreds of valuable chemical materials which would help defray the cost of the overall operation.

While not committing other industries to his conversion plant program, Mr. Hess assured the Association that the coal industry is prepared to cooperate. He conceded that the project he envisaged would be costly, but argued that the cost would be negligible compared with sums now required to build single pipelines from the gas fields to the gas markets.

The problem "would require," he said, "the cooperative efforts of experts in gas-making, coal hydrogenation, chemistry, coal mining and the oil industry."

Organizing Violence Flares

The UMWA organizing drive apparently was continuing in full force during October, as roving pickets, mine closings and violence were reported in various sections of Ohio, Pennsylvania and Kentucky. In Pennsylvania, the Clearfield County court issued a temporary restraining order against District 2, its officers and members, prohibiting interference with operations of three mining companies by massed picketing, threats or acts of violence or other intimidation or coercion. Following newspapers reports of the machine-gunning of a union organizer's car and dynamiting of a union hall, John L. Lewis wired the Kentucky governor Oct. 8 demanding an investigation and proper law enforcement to stop the "reign of terror in Leslie and Clay Counties." Restraining orders against the UMWA also were issued in Somerset County and in Guernsey County, Ohio, after mass picketing and violence.



DEPENDABLE
under severest
conditions of
dust and dirt!



DODGE-TIMKEN

- Even under layers of grime, dirt and abrasive dust encountered in many production operations, the Dodge-Timken Type C bearing carries its power load smoothly, efficiently, without interruption—because it's
- Triple-sealed to prevent the entry of dust, however fine. Accurately machined steel seals keep dirt out and lubricant in.
- Dodge mounts, seals, houses Timken precision bearing units in rugged assemblies
- (four different types) to deliver a minimum of 30,000 hours uninterrupted service.
- Dodge Timken Type C Pillow Blocks are fully self-aligning, with both radial and thrust carrying capacity.
- Delivered fully assembled, adjusted and lubricated, ready to lock on shaft. Locking collars at both ends insure firm fastening.
- Normally available from Dodge Distributors' stocks, sizes from 1-7/16" to 4-15/16".

DODGE MANUFACTURING CORPORATION, 3000 Union Street, Mishawaka, Indiana

DODGE

of Mishawaka, Ind.

CALL THE TRANSMISSIONER,
your local Dodge Distributor
for assistance on new,
cost-saving methods. Look
for his name under "Power
Transmission Equipment"
in classified phone book.

FIRST
IN POWER TRANSMISSION
MACHINERY!



V-BELTS AND TAPER-LOCK SHEAVES



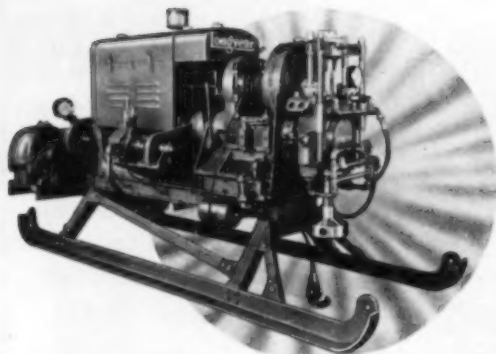
TORQUE ARM SPEED REDUCERS



ROLLING GRIP AND DIAMOND B CLUTCHES



SOLID STEEL CONVEYOR PULLEYS



SKF-equipped E. J. Longyear Company Diamond Core Drill.



SKF-equipped Vulcan Iron Works Mine Hoist.

why do so many prefer SKF?

It's pretty hard *not* to buy good bearings today, but SKF is the preferred bearing with many a mining equipment manufacturer.

There are good reasons why!

These manufacturers know SKF as a reliable, friendly supplier. They've learned to have implicit confidence in the experienced bearing engineering specialists at SKF's headquarters. They appreciate the teamwork of SKF field men who are qualified specialists in the application of bearings to mining equipment.

Their customers know the value of the complete maintenance service available to them through SKF's Distributor Organization.

Whatever your product, your engineers and designers can have this helpful SKF teamwork simply by asking for it.

7283

SKF equipped Robert Holmes & Enothers, Inc., Two-Speed Hoist and Head Sheaves.



SKF-equipped Brown-Fayro Company Car Spotting Hoist.



SKF

BALL AND ROLLER BEARINGS



WHY SKF IS PREFERRED BY ALL INDUSTRY

integrity • craftsmanship • metallurgy
tolerance control • surface finish
product uniformity • engineering service
field service

SKF INDUSTRIES, INC., PHILADELPHIA 32, PA.—manufacturers of SKF and HESS-BRIGHT bearings.

PARMANCO HI-SPEED HORIZONTAL DRILL

Completely Re-designed Around a 40 H. P. Engine

**Drills
a 6-inch
Hole in
two-thirds
the
ordinary
time**



Included in the new design is an auger rack which saves on drilling time. The augers are on the machine as it is moved from hole to hole. Another feature, for faster set up and smoother drilling, is the four individually adjustable leveling jacks. Automotive steering is optional.

This HI-SPEED DRILL is designed for drilling 5-6-8 in. holes to 100 ft. or more. The 40 h.p. engine with four drilling speeds makes possible the reduction of footage time by one third. This new drill, the very latest in design, is equipped with self starter and generator, dual type front wheels, truck type rear axle with hydraulic brakes and traction drive with both forward and reverse. Here is greater speed in retrieving augers and four rotating speeds and reverse for drilling and cleaning the hole. Here is accuracy and mobility. Here is the modern answer to faster, lower-cost drilling.

PARIS MANUFACTURING CO. PARIS ILLINOIS

NEW

LIFETIME HEADMOTION

**Biggest News of Coal
Washing Table Improvement
Since Deister Machine Company
Pioneered the First Coal Table
Installation in 1916!**

For cleaner coal . . . for more efficient recovery of finer sizes . . . here's the latest development . . . a new Coal Washing Table Headmotion in combination with an improved deck contour and riffing system.

Deister Machine Company engi-

neers, pioneers in applying wet gravity methods to the recovery and cleaning of finer sizes of coal, have based the design of this new Deister Coal Washing Table on their more than 35 years of experience in the table preparation of coal.

**LET DEISTER
PROVE IT . . .**



**ON YOUR
COAL!**

DEISTER MACHINE COMPANY

FORT WAYNE 4, INDIANA

And For Your Information . . .

A possible threat to coal-mine manpower was indicated Oct. 2 in the announcement by the West Virginia state employment service that the Anaconda Copper Mining Co. had openings for 1,000 experienced West Virginia coal miners in Montana. Men were being sought by an Anaconda "recruiter," it said.

The Pittsburgh Consolidation Coal Co. took the first-place "Oscar of Industry" for the best annual report in the coal and coke industry in the 1951 annual competition sponsored by the *Financial World*. Some 5,000 company reports in 100 industry classifications were entered in the contest.

Canada will have an experimental coal-burning locomotive gas turbine ready for testing next March, Prof. Donald L. Mordell, director of the McGill University gas-dynamics laboratory, told a meeting of the Canadian Institute of Mining and Metallurgy last month. The \$100,000 engine is being built by the University under a government contract in an effort to develop an economical engine for Canadian railways.

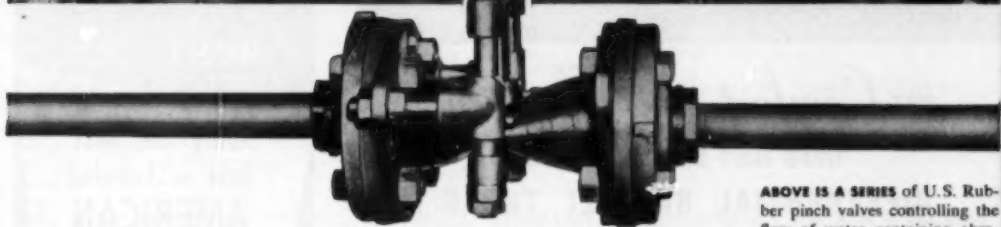
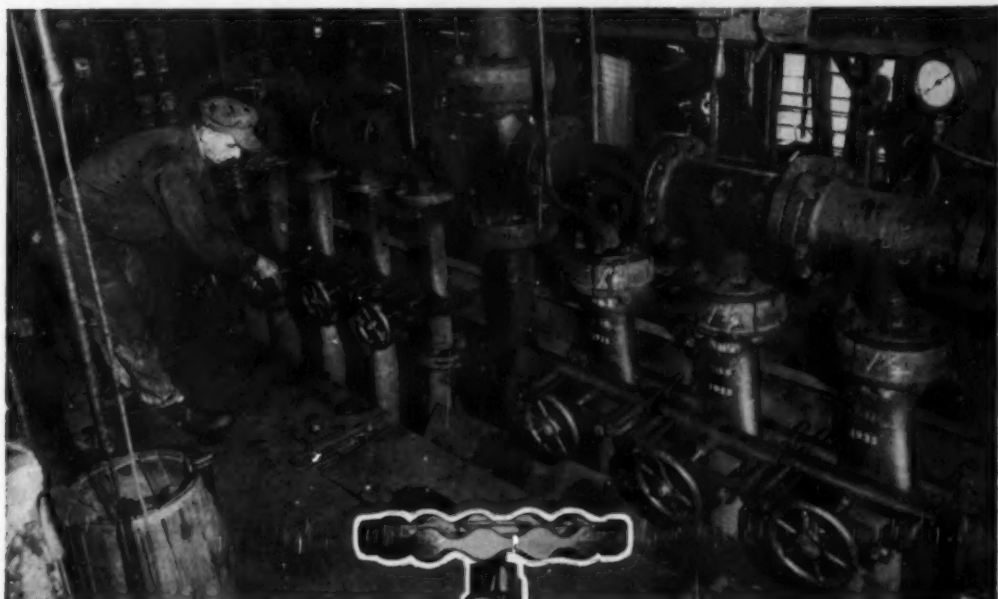
Joint Fuels Conference Views Coal's Progress

Begins on p 138

ing high-ash and moisture-bearing slimes, said D. A. Dahlstrom, Northwestern University. Laboratory tests show that this can be accomplished by simple classification near the 200-mesh point, using a liquid-solid cyclone as the most likely tool. With the cyclone, capacity is high, initial and operating costs are low and a sharp classification is possible. The big problem is eliminating the clays, silts and other minus 200-mesh solids to reduce ash and moisture content of the fine coal, while keeping the operation inexpensive, foolproof and simple. Present methods of desliming do not meet the need, for they occupy large floor areas and are costly and inefficient.

Illustrating the development and calculations for a complete cyclone process, using slimes from the Burning Star plant, Truax-Traer Coal Co., Elkville, Ill., Mr. Dahlstrom came up with an experimental two-stage desliming process that could be applied to full-scale operation with predictable results. Stage 1 would comprise five 20-deg included angle cyclones processing 575 gpm per cyclone at 25 psi pressure drop. This would accommodate 2,875 gpm of raw feed slurry containing 15% solids at a rate of 113.8 tph of dry solids. About 49% of these solids would report to the underflow of Stage 1. Stage 2 thus would handle 55.6 tph of solids and gross feed to Stage 2 would total 1,424 gpm, 571 gpm of fresh water per ton of raw feed having been added

What does U.S. Rubber's pinch valve do for the coal industry?



The new "U.S." pinch valve outwears metal when installed in pipe lines carrying abrasive or corrosive mixtures. Its flexibility offsets misalignment in pipes, absorbs vibration, breaks up galvanic action in pipes, eliminates "water hammer" and offers a positive seal in a closed position. The metal parts of the valve can be refitted to new valve bodies, thereby reducing replacement costs.

These valves are also available in neoprene for oil resistance, butyl rubber for high heat and severe acid conditions, and pure gum stock for food and beverage conveyance. Extremely compact design. Write to address below.

ABOVE IS A SERIES of U.S. Rubber pinch valves controlling the flow of water containing abrasives in a Pennsylvania coal preparation plant. Many of them have been in continuous operation for over 16 years. Below the photo is the newest of the U.S. family of pinch valves, shown in a closed position. Sizes range from 1½ inches to 8 inches.

PRODUCT OF



UNITED STATES RUBBER COMPANY
MECHANICAL GOODS DIVISION • ROCKEFELLER CENTER, NEW YORK 20, N. Y.

as dilution water before Stage 2. Underflow from Stage 2 would contain 44% of Stage 1 feed solids, or 50 tph of dry solids in a 55% slurry. At this rate, Stage 2 would require only two cyclones, each handling 712 gpm of feed slurry. Product from Stage 2 would contain an indicated slime content of only 5.6% and an ash of 10.5 to 12%. Mechanical dewatering would bring moisture content as low as 11%.

Slurry Thickening

"We would like to be able to report someday that we are pumping dirty coal washery water in one end, pushing out perfectly dry solids from the bottom and discharging crystal clear

water out of the top suitable for drinking, bathing and doing the family wash," said K. Prins, K. Prins Associates. Though that day may be far in the future, cleaning-equipment manufacturers are making progress, he said, as he gave an account of his company's efforts to produce an inexpensive device to reduce stream pollution.

The Prins "Streamcleaner," closely related to cyclone thickeners, is distinguished by addition of a motor-driven impeller which whirls water around vertically within an enclosure, thus producing centrifugal force and velocity to separate the suspended particles from the water. Clean water

overflows at the top of the thickener; solids exit at the bottom of the cone. Mr. Prins cited operating data from "Streamcleaner" installations at nine preparation plants, stressing low maintenance cost, high capacity, efficiency and simplicity. Advantages of the impeller, he said, are that desired water velocity can be maintained inside the machine and that the machines will operate at 15 to 25 lb line pressure at the water intake.

Thickening at Locust Summit

Desliming, water supply and slime disposal were the three big problems that had to be solved in recovering finely divided anthracite in the size range from 3/32-in to 200-mesh in the flotation plant of the Locust Summit Breaker, Ashland, Pa., said Hilmar R. Hagen, Philadelphia & Reading Coal & Iron Co. Problem 1 involved a slurry flow to the flotation plant of 1,600 gpm containing 30% by weight of anthracite and refuse solids, the solids averaging about 125 tph. The solids contained about 25% of minus 200-mesh material, 80% of which had to be removed before feeding the sludge to the flotation plant. To solve this problem, a 40-ft-diameter hydroclassifier of special design was installed to handle slurry plus 2,400 gpm of clear water. Overflow from the classifier now carries off a high percentage of the unwanted slimes.

Problems 2 and 3 were solved by

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Rotary Bit Drills 4500' In Potash Ore



Satisfactory results are reported in the rotary drilling of hard potash ore in southeastern New Mexico, as 4500 feet of drilling is being obtained in

langbenite per average bit life. Jeffrey A-6 Drills equipped with Kennametal Tungsten Carbide Insert Rotary Bits, 1½" in diameter, are used.

Iron Ore Rotary Drilled



In one operation in Minnesota, an unusual use of Kennametal Tungsten Carbide Rotary Drill Bits is being made to drill in the overburden in re-

covering low grade ore. The boring is done horizontally. Speed and mobility over the churn drilling method are the advantages reported.

108' Holes In Gypsum Drilled By Rotary Bit



A large gypsum mine operator in Virginia reports that holes are now being drilled successfully to a depth of 108 feet by the use of rotary auger-type

equipment, supplementing core drilling equipment for long hole drilling. Advantages are: Speed, freedom from water and dust, easy mobility. Kennametal 1½" Tungsten Carbide Bits and scroll-type auger are used.

Structural Bit Gives Big Ore Samples



A six-point "Chopping Bit" used on the Mesa Range to determine quality of formation is reported to cut cost 50% to 70% in two instances

where it has been used. A big feature is that it produces large, easy-to-analyze chunks of ore. It is set with 6 Kennametal Tungsten Carbide Inserts.

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COAL AGE • November, 1951

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After more years of experience than any other American manufacturer in the development of tungsten carbide rock bits, Kennametal has produced these modern bit designs that put the emphasis on drilling speed.

"Three-point" construction is offered in the Kennametal multiple-point bit to give additional drilling speed (10% or more in many cases) where the use of multiple-point bits are necessary. Where conditions permit, such as in solid hard drilling, the chisel-type bit gives still higher rates of penetration.

Kennametal Bits offer long life because they feature inserts of Kennametal tungsten carbide, the carbide used in more mining bits than any other carbide in the world.

Special construction features are: Good clearance for free removal of cuttings; easy reconditioning.

For dependable low cost results, use Kennametal "Insert-Type" Rock Bits.

Detailed information on request by writing: Kennametal Inc., Latrobe, Pa.



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IN METAL AND NON-METALLIC MINERAL MINES**

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building a 132-ft-diameter thickener, with a 7-ft, 5-in-high side wall, a bottom sloped 1½ in 12 in, a center depth of 15 ft, 8 in and a slurry discharge 24 in below the center point. Clarified water from the thickener is adequate for the flotation plant, enabling the company to discard its original plans to pipe water 9,000 ft against a 610-ft head. Cost of the piping system would have been \$190,000 and maintenance and operating costs would have been \$22,250 per year. Though original plans called for a 90-ft thickener at a cost of \$65,000, the 132-ft unit, with twice as much capacity, was built for about \$76,000.

Mechanism, rake and superstructure, built by the Hardinge Co., are equipped with two scraping arms and are so arranged that if an overload occurs in the tank, the increased torque, reaching a predetermined point, starts the rollers up the incline on the drive brackets, thus raising the entire scraping mechanism. When the rollers reach the limit of the incline, an automatic cut-out stops the mechanism.

The entire mechanism is operated by a 5-hp motor. Rake speed is 17.5 min per revolution. The hydraulic gradient between tank and pump sump maintains a constant flow of about 18% solids by weight. Thick-

ener underflow is pumped to a refuse basin, whence clear water is discharged periodically into a stream in conformity with anti-stream pollution laws. Overflow passes through a steel launder trough to a storage tank. The overflow line of the launder trough is a serrated steel strip, so built as to provide about 40% more line for overflow than a straight line.

The flotation plant works two 7-hr shifts per day, thus providing ample settling time every night for the tank. The thickener works one shift on the sixth day to remove settled solids. The thickened underflow has made the problem of fine-solids disposal a minor one.

Commenting on Mr. Hagen's paper, John Griffen, McNally Pittsburg Mfg. Corp., remarked that separation at minus 200-mesh is not cheap under any circumstances and urged that more study be directed to this problem. Victor Phillips, Eastern Gas & Fuel Associates, said that the problems described in Mr. Hagen's paper are typical of those which coal-preparation engineers will be facing in the years ahead. Though there is evidence that a two-stage cyclone circuit might have been used successfully, Mr. Phillips argued, the choice of an upward-current hydroclassifier has been justified by performance of the Locust Summit installation. Thickening of the minus 200-mesh solids and producing a clear effluent can be

PORTABLE COAL PREPARATION UNITS



(Patent Pending)

• Comprised of hopper, feeder, screen, picking table and single roll crusher. Capacity—125 or 150 tons per hour. Large heavy-duty Timken double-row roller bearings in the eccentrics and pillow blocks. Over-size Torrington spherical roller bearings in the crusher. The crushers are adjustable from ¾" to 10" opening. Screened coal over the picking table is diverted by a flap-gate to the crusher or mixed with the slack for mine-run. The screen has a snappy action, resulting in efficient screening.

The picking table has a smooth motion which allows selective picking of the impurities which are disposed of in the trough running over the center of the picking table.

The unit is equipped with magnetic starters and push-button controls, 10 to 15 HP motor on the crusher, 5 HP motor on the screen and picking table. It can be readily transported from one location to another on a standard long-wheelbase truck, with minimum cost for moving and erecting.

When used in conjunction with a belt or chain conveyor, the unit can be adapted to various arrangements for handling the coal from the trucks or mine cars, through the cleaning unit, to the railroad cars or bins.

The use of oversized anti-friction bearings throughout these two unit sizes insures trouble-free operation, with low power and maintenance costs. Full information upon request.

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ON THE REEL

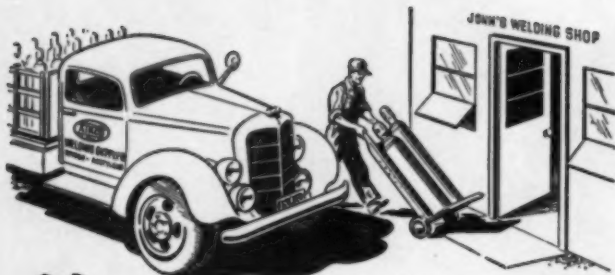
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done best in a stationary gravity-type thickener, he argued.

General floor discussion following the session on thickening and desliming ranged around the control of froth that forms on thickener tanks, the cost of enlarging the capacity of settling tanks and the use of an impeller in a cyclone thickener.

Running a Coal Railroad

The Norfolk & Western Ry. is operating economically with 100% coal-burning steam motive power, said Col. R. H. Smith, president of that railroad, at the Thursday luncheon. To achieve its high efficiency, the company has designed and built all its own locomotives since 1927, with the result that they are adaptable, compact and modern and especially suited to the mountain terrain the company operates in. The railroad provides the most modern maintenance services, terminals and dispatching facilities and demands good-quality, properly sized, double-screened coal for locomotive fuel.

Since 1923, Col. Smith explained, the number of locomotives in service on the N. & W. has decreased 51%, gross ton-miles has increased 45% and coal burned has declined 35%. Further improvements are in the making, he predicted, notably a coal-burning steam-turbine electric-drive locomotive that will be road-tested before the end of 1952. The new-type locomotive, being designed and built with the cooperation of the Baldwin Locomotive Co., Westinghouse Electric Corp. and Babcock & Wilcox, will operate at 600 lb pressure and 900 deg F superheat.

Meanwhile, to promote the use of coal, the N. & W. is supporting the Locomotive Development Committee of BCR, operating coal bureaus in a number of cities, advertising the advantages of using coal, contributing to BCR and other institutions for the support of general research in coal, and building the world's largest and most complete rail coaling station.

Helping Coal Customers

Rightfully, the fuel engineer is a member of both operating and sales staffs, said U. B. Yeager, Island Creek Coal Sales Co. Mr. Yeager was the first of four speakers in a symposium on engineering service in the coal industry. Other speakers were: George P. Cooper, Empire-Hanna Corp.; Max A. Tuttle, Enos Coal Mining Co.; and E. J. Kerr, Baltimore & Ohio R. R.

In studying the problem of a prospective customer, the fuel engineer must (1) survey the equipment and operating conditions that are to be met; (2) recommend a coal application, thus making possible a sales proposal; (3) reconcile price and use values against the background of the competitive situation; and (4) help the customer get the best service from his fuel, Mr. Yeager said. The fuel engineer must take operating conditions and equipment as they are and

How to care for Mining Machine Cables



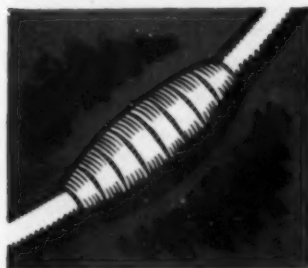
1 Buy cables that can carry the required current without overloading or overheating. They should be flexible (having sufficiently fine strands) for the intended use.



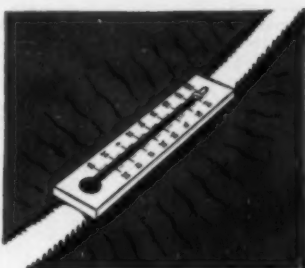
2 Keep voltage in the working sections up to standard.



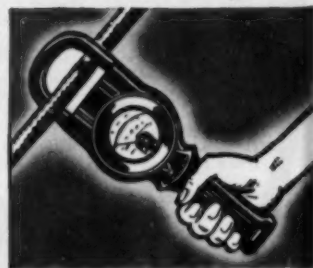
3 Keep bonding up to standard and provide adequate returns.



4 Splice properly and vulcanize. Splices should be strong electrically and mechanically and should be well insulated with materials suited to the cable type. The number of temporary splices should be limited and when that limit is reached the cable should be taken out of service and the splices made permanent by vulcanizing. Conductors should be spliced or joined so that they are mechanically and electrically secure without solder and then, unless an approved splicing device is used, they should be soldered with a fusible metal or alloy, or brazed or welded. Sharp edges and points should be avoided in soldering, welding or brazing. All joints and free ends of conductors should be covered with insulation equal to that on the conductors.



5 Avoid overheating. Do not overload. Keep cables as short as possible. Where possible, as in conveyor work, sectionalize the cables into short lengths, giving due thought to safety in the type of cable connectors selected. Long single cables, such as are used in conveyor mining, should be stored in long, loose loops, preferably on the mine floor, since loops on the rib add to the difficulty of fighting any fire that might occur. Do not pile cable in tight coils. On such equipment and mining and loading machines equipped with reels, attach the nips far enough back to spool off the cable. If that is impracticable, unreel the cable and spread it out on the bottom.



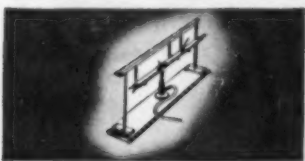
6 Avoid overloading of cables. Where possible, use I.P.C.E.A. recommended current ratings. Where cables are used in one or more layers on a reel, use I.P.C.E.A. recommended factors for reducing the current.



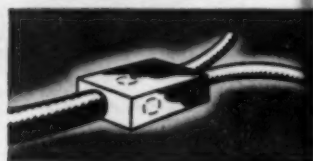
7 Place cables where they can't be run over. Anchor them to prevent jerking, avoid severe twisting and kinking, take precautions against cutting, protect against falls and keep cable tension down.



8 Protect cables with fuses or circuit breakers of the proper rating for the service. Make sure that circuit breakers will operate properly.



9 Use flame-resistant cables whenever possible.



10 Use junction or distribution boxes for making multiple power connections in working places.

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do as much as he can with them and his product to give satisfaction to the customer.

To help the fuel engineer render better service, more research is needed on slag formation, heating surfaces, physical characteristics of pulverized fuels, ignition speeds, effect of moisture content, flame volumes under various conditions, softening temperatures of various coals, and agglutinating values.

Obligations of the fuel engineer often take him far beyond the narrow limits of his job, Mr. Yeager said. He is called on to help in designing burning equipment, advising small-plant owners who cannot afford the services of a consulting engineer, conferring with architects, assisting retail dealers, training young fuel engineers, and guiding research that will lead to a solution of some of coal's merchandising and utilization problems.

The problem of fuel selection for various plants in Canada is a complex one, said Mr. Cooper. Since most Canadian coal is shipped by water, the problem is complicated by questions of storage, repeated handling and weathering, including freezing. In addition, there is a wide variety of fuels to select from, with coals reaching Central Canada from nine producing districts and several foreign countries and ranging from peat and lignite up through anthracite. Canadian fuel engineers are broadening their information and skills to meet this complex problem. They are serving as liaison between producers and customers and are influencing the production and preparation of coal and the design of burning equipment. Because the higher-rank coals in Canada are being depleted, there is a growing need for fuel engineers. To meet this need, Canadian universities are offering courses in combustion engineering.

Selling in a highly competitive market area, Enos Coal Mining Co. has accepted the doctrine that the fuel engineer should have not only the final say on coal preparation and base sizes but also the right to specify size and quality shipped on test or initial orders and when market conditions require substitutions, Mr. Tuttle explained. The fuel engineer must select the size and quality of coal best suited to the load and burning equipment, or he must select the size and quality that will strike a balance between satisfaction and competition. "Eventually, the coal industry must recognize that the price differential for sizes must be leveled off. Gouging the smaller consumer will of certainty place the industry at the mercy of the utilities, super-industrials and competitive fuels," Mr. Tuttle warned.

The B. & O. provides fuel engineering services for itself and its customers, often working in cooperation with fuel engineers from coal-producing companies, Mr. Kerr pointed out. Much attention goes to the small



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3/4"	1.050	0.824	350	0.140	400 ft. coils
1"	1.310	1.070	200	0.181	300 ft. coils
1 1/4"	1.660	1.380	200	0.267	300 ft. coils
1 1/2"	1.900	1.610	200	0.320	250 ft. coils
2"	2.378	2.070	170	0.445	200 ft. coils
2 1/2"	2.875	2.469	170	0.680	200 ft. coils
3"	3.504	3.070	165	0.910	100 ft. coils
4"	4.504	4.030	130	1.250	25 ft. str.
6"	6.630	6.070	115	2.230	25 ft. str.

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In an Indiana mine, an electrically-operated CP MOBILE ROOF BOLTING UNIT takes only an average of five minutes to drill a $1\frac{1}{8}$ " diameter hole to a depth of 46" and install and tighten an expansion bolt.

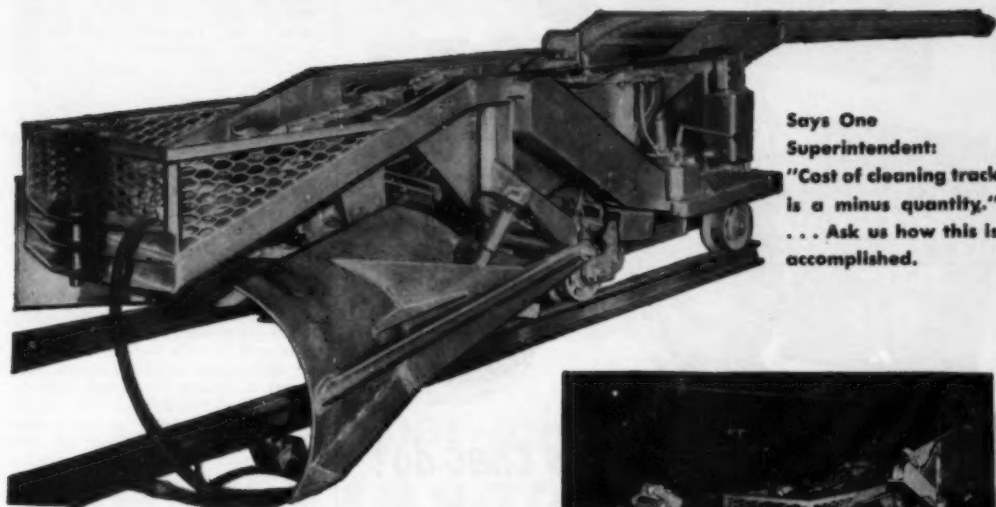
In this combination unit one motor drives both auger and bolt runner. A built-in slip clutch permits adjustment of bolt-running torque and protects motor against stalling. This motor can be shifted to allow withdrawal of drill steel without moving the unit. The feed motor also is protected against stalling by a built-in slip clutch. Telescoping chuck adapter permits 14" of auger adjustment.



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OF all recent developments in mechanical mining, the Canton Track Cleaner is perhaps the greatest money maker—per "use-time." No track workers to get hurt. Clean tracks once thoroughly with the Canton Track Cleaner. Then subsequent cleanings yield good coal. Load cars higher, haul more tonnage. Reclaim spillage mechanically. Write us for name of nearest mine where you can make inspection.

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Write us what your 1951 track cleaning costs were . . . and how many miles of track you clean, and we will show you how much extra profit you can make in 1952 with a "Canton" Track Cleaner, after it has paid for itself.

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plant, since it is most vulnerable to conversion to competing fuels. B. & O. services include the following, Mr. Kerr said: (1) market studies on the size and kind of coal wanted and marketable; (2) plant surveys to determine the correct fuel to use; (3) general services for coal producers and sales agents, especially those who do not employ their own fuel engineers; (5) consultation with smaller producers, especially on what markets to aim for and how carefully to prepare coal; (6) contact with design and construction engineers engaged in building new plants; (7) advice on locations for new plants, fuels availability being a factor in making a recommendation; (8) efforts to maintain coal's competitive strength in the fuels market; and (9) educational and training activities in the use of coal.

Controlling Gob-Pile Smoke

Though much of the early air-pollution legislation was based on hysteria and misinformation, a far better understanding now prevails, said Henry F. Hebley, Pittsburgh Consolidation Coal Co. Even so, he urged, fundamental research on the causes of gob-pile firing, methods of controlling such fires, and the economics involved should be pressed with diligence. Citing progress already made, he listed the following studies now under way in various stages of advancement: (1) the various combustibles associated with mine refuse and the causes of spontaneous combustion; (2) various methods for storing refuse and the results obtained; (3) methods used in efforts to extinguish gob fires; and (4) the possibility of removing pyritic content and recovering sulfur as a byproduct.

In discussion following Mr. Hebley's paper, W. L. Nelson, Mellon Institute, reporting research done for the Western Pennsylvania Coal Operators' Association on gob-pile fires, pointed out that flyash appears to be a better seal than clay for gob piles, that grouting has been done successfully though at high cost, that the heat of formation when sulphuric acid is formed appears to cause ignition, and that the periodicity of annoyance from gob piles seems to be geared to the weather, varying in direct relation to the quantity and frequency of rainfall.

New Way to Test Coke

A new way of measuring the free-swelling properties of coals was proposed in a paper prepared jointly by E. Swartzman, engineer, and G. C. Behnke, technician, Department of Mines & Technical Surveys, Ottawa, Ont., and read by Mr. Swartzman. The authors explained that the standard ASTM method uses a gas burner that requires frequent calibration because of variations in gas pressure and quartz crucibles that are not standard equipment, so that small variations in dimension and wall thickness result in wide variations in



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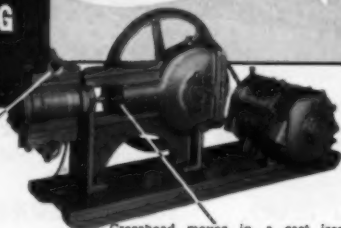
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the size of the coke button. The new method devised by Messrs. Swartzman and Behnke uses a standard laboratory 350-watt cone heater and standard 15-cc platinum crucibles. This equipment, they point out, is rugged, easily calibrated and readily replaceable. The results of numerous tests conducted with this new apparatus show that the free-swelling index values as judged by the buttons are exactly the same as those produced by the standard gas-burner method, irrespective of the rank of the coal, its origin or its swelling properties.

Discussion from the floor was offered by Charles Sawyer, Eastern Gas & Fuel Associates, who suggested that further studies be made on American coals with the new method; Mr. Textor, who stressed the difficulty of maintaining an 820-deg temperature with a gas burner; and George Keller, Commercial Testing & Engineering Co., who declared that present testing methods are crude and not altogether accurate or practicable.

How Stored Coal Changes

Faced with obvious changes in coal characteristics taking place during storage and with consequent troubles in fire-chamber and boiler operation, Philadelphia Electric Co. set up five storage piles of Central Pennsylvania low-volatile coals in an effort to find out what caused the changes and how to prevent or modify them, said Thomas F. Downing, Jr., of that company. With thermocouple readings, detailed laboratory analyses and careful observations stretching over long periods of time, the company reached the following conclusions:

1. Covering pile surfaces will at least delay moisture and air penetration and resultant changes.
2. Penetration of air and moisture can be retarded by dense compaction.
3. Proportionate tonnages subject to changes are dependent largely on shape or width of pile base and length of time in storage.
4. Proper methods and equipment for storing and recovering coal can produce substantial economies in storage operations and plant utilization.
5. Changes in stored-coal characteristics occur to depths of excess moisture penetration.
6. Most added moisture within a coal pile is carried there by winds.
7. Coking characteristics may deteriorate to the extent of making the coal unsuitable for intended uses.
8. Breakdown of pyritic sulphur contributes to ash-fusion temperature increases.

9. Spontaneous combustion in piles of properly placed Central Pennsylvania low-volatile coals should not occur after 18 wk in storage.

10. In these coals, ash-fusion temperature and sulphur definitely change and other constituents probably change with time in storage.

J. F. Barkley, USBM, speaking from the floor, asked why, as Mr.

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Very truly yours,

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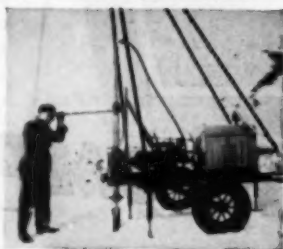
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Downing's tables showed, sulphur was lowered in stored coal and where the sulphur went. Mr. Downing replied that it may have passed off as sulphur dioxide or that it may have changed to sulphuric acid and leached out. Mr. Downing pointed out that these changes in sulphur content appeared to take place at points reached by moisture.

Mr. Nelson commented that the brassy forms of sulphur are not so reactive as sulphur balls and that the Mellon Institute is now doing research in this area of investigation.

Moisture and the Vacuum Filter

Operators can anticipate average cake moisture and variations in cake moisture when dewatering fine solids by continuous vacuum filters if average size particle is known, said Mr. Lyons. Average particle size, he explained, is calculated by averaging the linear openings of the various pairs of screens used in the screening test, weighted with the percentages of material in the various fractions.

Objections to Mr. Lyons' conclusions were offered by Mr. Blair, who pointed out that he could not reconcile the straight-line relationships shown on the graphs with the shot-gun pattern of individual points; and by Mr. Griffen, who argued that there are bound to be other factors than particle size that govern moisture content of a filter cake. Mr. Griffen insisted that firmer information is needed than was shown on the graphs.

Keeping Small Plants on Coal

To stop changeovers to oil among small steam plants, coal producers must get the cost story to the men who are responsible for the profits of the corporation, said A. R. Miller, General Foods Corp. Mr. Miller was the first speaker in a five-man panel discussion on fuel and equipment consulting service for small steam-generating plants. Other speakers were Earl C. Payne, Pittsburgh Consolidation Coal Co., who presented the point of view of the coal producer; H. C. Carroll, Carroll, Bechtel & Hardy, for the consulting engineer; E. C. Webb, Iron Fireman Co., whose paper on the equipment manufacturer's point of view was read by Tom Marsh, of the same company; and W. S. Major, Dravo Corp., who presented the point of view of the construction contractor.

Referring to the 24 steam plants operated by his company, Mr. Miller reported that they produce from 5,000 to 50,000 lb of steam per hour, that 68% of these plants burn coal and that the average annual use of coal is 1,600 tons each. Mechanical coal-handling equipment is installed only when necessary to avoid employing a second man on the shift. Fuel cost is the major factor in fuel selection. The following conditions are peculiar to small-plant operation: (1) steam-raising is a negligible part of the cost of plant product; (2) reliability of operation is of major importance;



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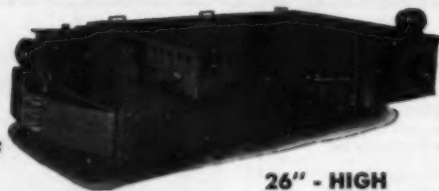
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(3) a short pay-out period is essential in installation of new burning equipment; (4) cleanliness is an important factor; and (5) although good engineering usually goes into a new steam installation, additions to existing plants do not get adequate engineering attention. On the whole, Mr. Miller said, technical help does not reach the small plant.

Consulting Service Urged

Although small steam plants in the Nation burn at least 75,000,000 tons of coal per year, oil and natural gas are making severe inroads in this market, Mr. Payne warned. Coal's losses in this market are attributable to: (1) coal's loss of price advantage; (2) lack of engineering help to keep plants operating at high efficiency; (3) failure of modernization and new construction to keep pace with engineering progress; and (4) neglect of small-plant business by the coal industry, equipment builders and engineers.

To hold and enlarge the small-plant market, Mr. Payne proposed that the coal industry itself, including producers, retail distributors and equipment manufacturers, assume responsibility for advising small industrial and commercial customers and prospects for coal. This responsibility would be discharged through establishment of a Fuel and Engineering Consulting Service under the National Coal Association or BCR, with a director of engineering and an adequate staff to serve the small-plant owner. The director and his staff would supervise and coordinate the activities of regional advisory committees for each area selected for development. Regional committees would include engineers representing producers, equipment builders and consultants and the chairman of each regional group would be an employee of the national agency. The committee would supervise technical promotional activity and engineering service and would shape policies involving fuels and equipment. A major activity of the group would be preparation of standardised packaged plans and specifications for small steam plants of various sizes. The plans would be available through professional consulting engineers.

More Help for Small Plants

Consulting service is seldom employed in construction and operation of small steam plants, Mr. Carroll pointed out. Three facts account for this situation: (1) architects, who are called in first, usually provide mechanical-engineering services; (2) the number of small plants makes solicitation by the consulting engineer too costly; and (3) equipment manufacturers and steam-plant contractors provide free advice. Only the consulting engineer can provide the services really needed, Mr. Carroll argued. He can make a thorough preliminary

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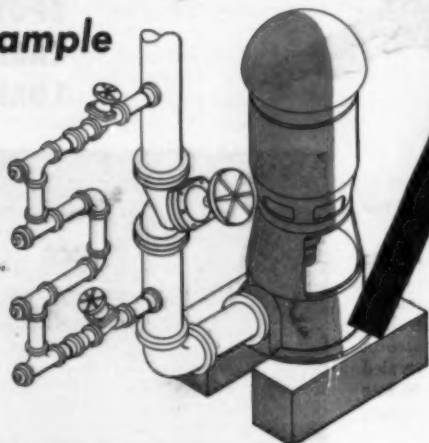
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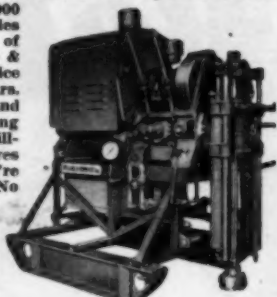
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survey and report, provide data on coals that are available, maintain efficient operations after the plant is built; assist in fuel evaluation, check plant performance and steer the plant owner away from costly mistakes.

The coal industry can help consulting engineers render more valuable service by providing more data on the kinds, sizes and costs of coal that can be delivered in each marketing area and by stressing the value of consulting services to coal customers, Mr. Carroll said.

The equipment manufacturer must improve his product and its acceptability to stay in business, giving attention to design, efficiency, appearance and economy, Mr. Marsh said, speaking for Mr. Webb. He cited ways in which equipment manufacturers can help coal customers and producers, as follows: (1) urging the use of consulting-engineering services; (2) providing helpful data to the customer and the consulting engineer; (3) following through to see that equipment is properly installed, operated and maintained; (4) helping in the maintenance and modernization of the plant; (5) drawing on his wide experience to advise the plant owner; and (6) keeping customers posted on new equipment available for automatic and more efficient operation of small plants.

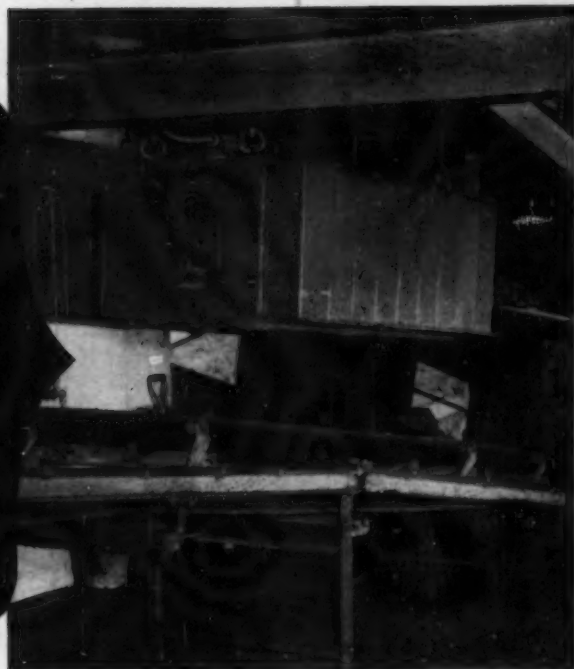
Most of the operating problems and high operating costs of small steam plants arise from design limitations, Mr. Major said. This is especially true of designs based on fuel characteristics, supplies and prices that prevailed at the time the plant was built but are not existent today. Thus many small plants are characterized by one or more of the following: (1) small grate area; (2) inadequate combustion volume; (3) poor furnace configuration; (4) incorrect type of stoker; (5) limitations on boiler output; (6) suitability to liquid or gaseous fuel only; (7) lack of space for coal storage; and (8) restricted working space.

Since annual feed consumption per installed boiler horsepower in small plants is generally lower than in large plants and since steam loads are principally seasonal or process, ranging from 2,400 to 3,600 hr per year, the benefits of mechanical burning equipment and automatic controls must be justified largely on labor savings and better stack-discharge conditions, rather than on fuel cost, Mr. Major explained. Looking to fuel savings only, and overlooking such items as fuel flexibility, added reliability and lower labor costs, the plant owner seldom realizes that fees for consulting services pay good dividends. For these reasons and others, most small steam plants will continue to be built mostly from catalog data and the suggestions of equipment and fuels representatives, rather than from detailed engineering studies of consultants, he concluded.

In discussion from the floor, W. C.

LOOK AT THAT AIR GAP — a large midwest coal plant reports extremely effective iron removal from the Dings Deep Burden Rectangular shows.

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searches
down 18"
to YANK
tramp iron
OUT!**



—DINGS Heavy Burden Rectangular Suspended Magnet

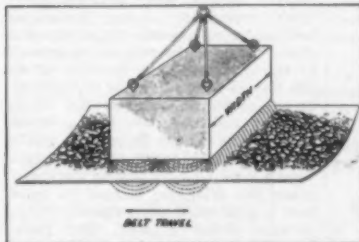
HERE'S power that will effectively penetrate through 18" of space and coal — and come up with tramp iron — power that in a factory test jerked a 1500-lb. steel channel through a 22" air gap!

In short, it's the most powerful tramp iron magnet built.

This is the magnet to use on your tough jobs — the high belt speeds, the deep burdens — the places where tramp iron damage to machinery means DOWN TIME. Throw in the fact that you're shipping iron free coal and you have the reasons why case records have shown Dings Rectangular Magnets have paid for themselves in less than a year. Dings Magnetic Separator Co., 4720 W. Electric Ave., Milwaukee 46, Wisconsin.



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Evenly distributed edge-to-edge flux pattern as diagrammed is big reason for choosing rectangular over circular magnets. For this reason Dings builds other rectangulars which while not as powerful as the Heavy Burden Magnet above are effective at distances up to 12" and have found wide application in the coal industry.

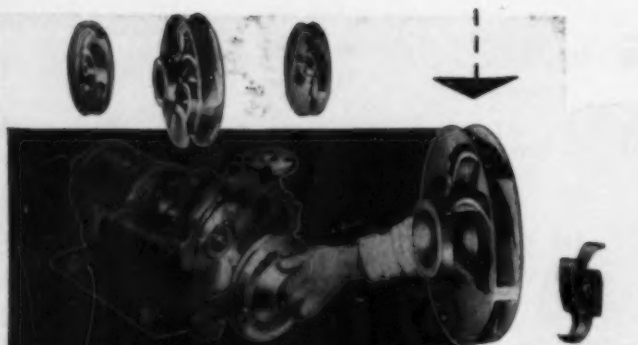
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Houghton, Battelle Memorial Institute, reported on Battelle's progress with a small-plant package unit incorporating, among other features, a spreader stoker, automatic fuel and ash handling, and a locomotive-type arch. In reviewing Battelle's preliminary studies, he pointed out that: (1) oil-burning package units, when fully installed with auxiliary equipment, actually cost more to install and operate than a similar coal unit; (2) trained personnel is needed for oil and gas equipment as well as for coal and is equally hard to obtain whatever fuel is used; (3) the explosion hazard is ever-present in oil and gas installations; (4) a costly, high steel stack is required for oil and gas as well as for coal; and (5) gas and oil package units do not always fit the job and thus require costly modifications.

Continuing the floor discussion, William Christie, Smoke Control Bureau, New York City, urged using the services of consulting engineers to control the smoke nuisance and pointed out that many superintendents and operators of small plants know little about proper plant operation. Speaking for B. H. Lammers, Coal Producers' Committee for Smoke Abatement, Harry Ballman, Smoke Bureau, Columbus, Ohio, endorsed Mr. Payne's proposal for an engineering and fuel consulting service for small steam plants but suggested that the scope of committee activities as outlined might be too broad and that regional committees might be too widely dispersed. For his own part, Mr. Ballman pointed out that consultants are not eager to work on the limited scale required by small plants but insisted that consultants' services are badly needed.

39th Safety Congress Reports on Progress

Begins on p 136

veteran miners, who recounted their work experience during individual half-centuries on coal properties and their views on the personal approach to safety. The cogent remarks of all the men in the panel were crystallized in an exchange between Mr. Davis and his audience. Mr. Davis, whose experience includes 26 yr as a tipple foreman, stated that he had never fired a man. Quickly seizing the statement, the delegates wanted to know how a man could supervise for 26 yr without firing a man. Mr. Davis brought down the house with this classic rejoinder:

"Ah said Ah never fired a man and Ah mean it. When Ah had a man who couldn't obey safety rules, he done automatically fired himself."

During their visit to Chicago, Mr. Bailey arranged for radio and television appearances by the safety veterans.

Closing the program for the after-

How to make Loaders

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2. Basic chain is roller type with rigid stud bushings. Riveted construction eliminates cotter pins — assures tight plates.
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noon, M. J. Kosik, secretary, Anthracite Board of Conciliation, announced a new safety idea soon to be tried in the anthracite region. Local radio stations will broadcast early-morning safety hints, which will be carried in the washhouses of cooperating companies before shifts begin.

Haulage safety was the theme of the Wednesday session. Speakers were: M. J. Ankenny, chief, coal mine inspection branch, USBM, Washington; D. S. Kingery, engineer, coal mine haulage safety section, USBM, Washington; W. R. Kirkwood, chief coal mine inspector, Tennessee Coal, Iron & R. R. Co., Pratt City, Ala.; and A. E. Crook, principal inspector of mechanical engineering in mines, London, England.

Safety Factors in Haulage

Mr. Ankenny keynoted the proceedings with a brief analysis of haulage-accident experience in anthracite and bituminous mines as contained in USBM Information Circular 7604.

Mr. Kingery explained the human attitudes among haulage employees which may be a major contributing factor to haulage accidents. The personal trouble a man brings to his job can expose him to hazards because they occupy his mind while he unthinkingly performs his tasks. Preoccupation is a definite block to safe practices Mr. Kingery declared. A sincere desire on the part of the foreman to understand and alleviate such preoccupation is a safety contribution. The training goal for haulage employees should parallel the training given to infantry soldiers, Mr. Kingery said, so that a man makes the proper response to a hazardous situation no matter how tired or troubled he may be.

"Trolley phones are the latest contribution to making haulage a safer activity in coal mines," Mr. Kirkwood said, in describing the use of 12 trolley phones on locomotives at the TCI Docena mine. Pointing out that all haulage men now are on a "party line" system, Mr. Kirkwood noted that now every crew knows what every other crew is doing, thus smoothing out the haulage operation throughout the mine. The safety potential in trolley-phone communication is tremendous, Mr. Kirkwood said, and increased turnover of available cars has been noted.

Diesels Safe in Britain

Mr. Crook distributed a 15,000-word paper and numerous charts which form a comprehensive survey of British haulage practice, safety, equipment, methods and personnel. The trend in England heavily favors the use of diesel units, but plans are underway for testing the first trolley-haulage systems in British mines. On diesel safety, Mr. Crook declared that he had never heard of a single case in England or on the Continent where ill-effects among underground employees could be traced to diesel exhausts. Strict maintenance and inspection are

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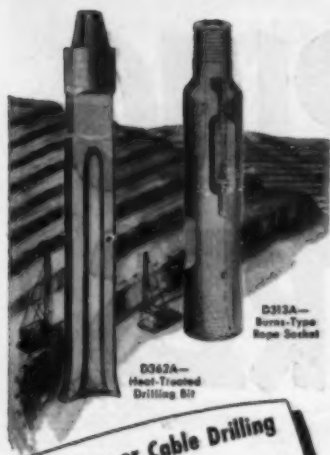
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2. In Loading Grease Guns . . . by saving 3% man-hours for every 100 pounds of lubricant loaded into hand guns.



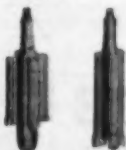
3. In Applying Lubricants . . . by saving up to 23.9 man-hours for every 100 pounds of lubricant applied to bearings.



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necessary, Mr. Crook emphasized. Speaking of belt haulage, Mr. Crook suggested that anti-slip controls should monitor both belt and pulley so that control circuits could be interrupted by the device when the difference in speed between belt and pulley indicates excessive slip.

Prevention and control of harmful dusts was the topic presented at the Thursday session by the following speakers: W. M. Merritts, mining engineer, USBM, Salt Lake City, who collaborated with E. O. Jackson, general superintendent, coal mining department, Independent Coal & Coke Co., Kenilworth, Utah, in preparing his paper; William J. Evans, chief coal mine inspector, Department of Labor & Industries, Seattle, Wash.; and James Westfield, Jr., chief, Health and Accident-Prevention, Region VIII, USBM, Pittsburgh. J. V. Berry was session chairman.

Sprays on Continuous Miners

Describing the dust hazard in Utah mines as among the worst in the United States, Mr. Merritts outlined the spray system on continuous miners now in use at Sunnyside Nos. 1 and 2 mines, Kaiser Steel Corp., Sunnyside, Utah. Seven high-pressure spray nozzles surrounding the cutting head and on the conveyor discharge about 12.5 gpm at 300 psi to effectively allay dust produced by the machine. At constant output, use of a wetting agent in the spray water resulted in greatly reduced dust counts, Mr. Merritts pointed out, in recommending wetting agents for better dust allaying. Wide-angle sprays were applied closer to the face and narrow-angle sprays were mounted farther back on the machine.

In Part 2 of his paper Mr. Merritts described water infusion of coal pillars as a dust-prevention measure. A full description of this development, entitled "Pillar Soaking at Kenilworth," appeared in the August, 1951 issue of *Coal Age*.

Reducing Dust From Blasting

In commenting on control of dust resulting from blasting, Mr. Evans described the great measure of success achieved in mines in the State of Washington by using milli-second-delay blasting and a fog gun. The gun is a Lamb air mover, to which is added an inlet pipe for introducing water into the stream of compressed air.

To pin-point the improvements under the new system, Mr. Evans quoted results of tests made by L. H. Johnston, of the USBM, in May, 1947, at Bellingham mine as follows: "In 10 South back entry, with no fog gun, multiple shooting showed a concentration of 86 million particles per cu ft of air, and the average on two samples during single-shot blasting was 188 million. In 10 North entry, with the fog gun operating, the results showed 11 million on multiple shooting compared to an average of 14 million on single-shot blasting."

Mr. Evans reported that contract

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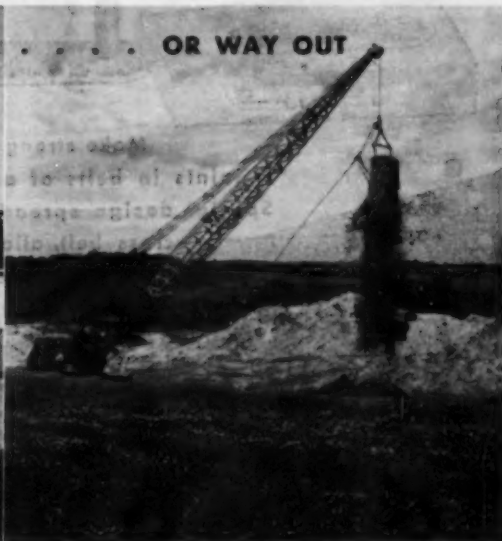
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Coal stripping with a 3900. Handling a 2½ yard bucket on a 100-foot boom. Big capacity — big reach.

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60 tons at 12' — or 30 tons at 30' means plenty of capacity for the big loads. When equipped with a torque converter you can "inch" your biggest loads into position with pin point accuracy.

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Out on jobs there are Manitowoc 3900's with 140' booms, with jibs up to 20 feet extra — enables you to set steel, place concrete, for 13 to 14 story buildings, with complete safety.

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Specially designed for long boom work. Look at this capacity: 20,000 lbs. with a 100' boom at 60' — even with a 100' radius you handle 9500 pounds. As a dragline you can move dirt as far as 150' — handle 2½ yd. bucket on a 100' boom. That's reach — that pays off in work capacity.

More Capacity than any machine in its class!

Out on the job, where you can PROVE performance, the Manitowoc 3900 has set amazing new standards. You get rated capacity of 60 tons at 12 feet BUT farther out is where this husky unit pays off. Exceptional stability provides a bonus as much as 8½ to 18 tons greater than other machines of its rating and price class.

The reason is found in its long (20'-4") wide (16'-8") crawler base which supplies extra stability and low ground pressure. The counter-weight, an integral part of the revolving frame, is placed well back and low, carried directly by the boom support straps.

And when you consider such features as the torque converter; easy shipment on flat cars or trailers; simplicity of design; high operating speeds, you've got a machine that will outperform any other on any job. MANITOWOC ENGINEERING WORKS, MANITOWOC, WISCONSIN.

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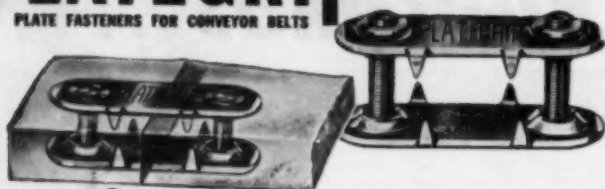
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miners claim their output is higher by 3 tons per man-day and their earnings are better in sections using millisecond delay shooting and the fog gun. In describing the gun, Mr. Evans said it is similar to the one shown on p 114 of the August, 1948, issue of *Coal Age*.

New Problem with Bolting

Drilling for roof bolting has created a new dust problem for the industry, Mr. Westfield declared, emphasizing that controlling dust from vertical holes is more difficult and that dust from roof holes contains significantly greater amounts of free silica, the agent that causes silicosis.

Pointing out that 71% of the mines in Region VIII employ no dust-control measures in roof drilling, Mr. Westfield stated the Bureau's position as advocating some means of dust control and preferring dry dust collection rather than wet drilling in vertical holes.

In the ensuing discussion, Mr. Ankeny cited the remarkable progress made in the last 2 yr and declared that similar progress in the future will go far toward solving the problem. The discussion also brought out operators' objections to being cited for violations under the Federal Code when they feel the available equipment will not yet do the job. Manufacturers' representatives declared that the problem is being attacked and effective collectors of reasonable size, weight and price are their goal.



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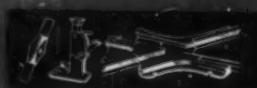
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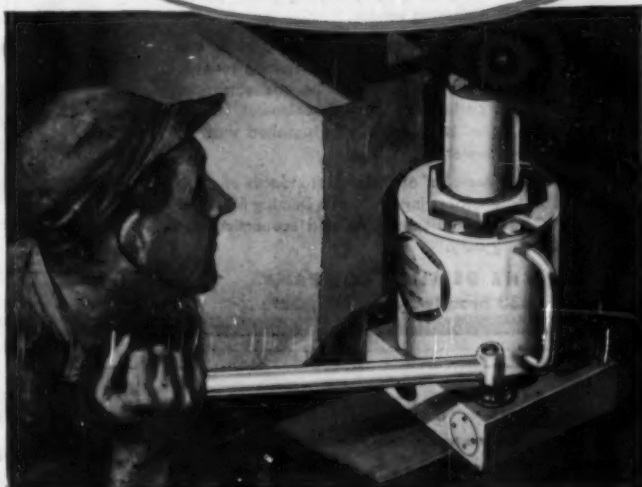
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...from the world's most complete
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Double-Acting Mine Pumps

PERFORMANCE...not price...determines the economy of using these heavy duty, reciprocating power piston pumps in mine gathering service.

Timken tapered roller bearings on pinion shaft are adjustable to compensate for wear after long service. Stainless steel piston rod resists scoring and corrosion. Pinion of high carbon steel has machine-cut, helical teeth and is keyed to a ground and polished shaft of extra large diameter.

Those are just "samples" of the high standards of engineering and manufacturing that make Deming Fig. 1896 "Oil-Rite" pumps so dependable and economical for mine gathering duty.

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Burns Any Type of Fuel

The "Sutton" Sand Dryer may be fired with any type of fuel. While most "Sutton" Sand Dryers are equipped to burn coal, they can be furnished with burners for natural gas or fuel oil.



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TRUCK and TRACTOR TRAILER SCALES



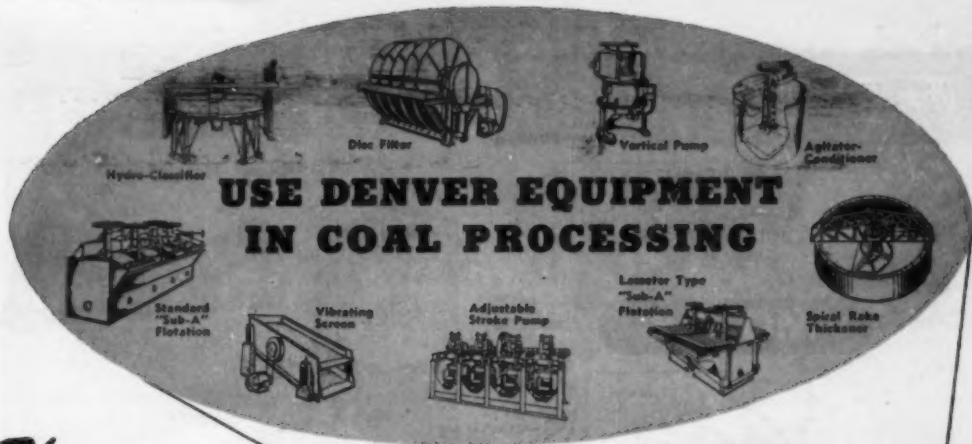
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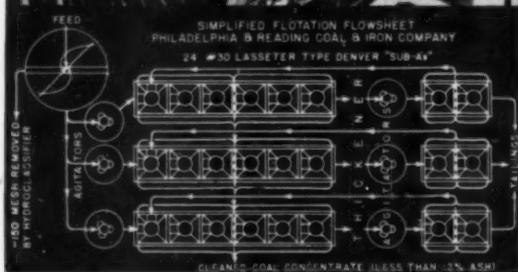
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(Lasseter Type)
FLOTATION



**...TO RECOVER ANTHRACITE
COAL FINES... LOW ASH
CONCENTRATE AT LOW COST**

Products: Anthracite Coal Fines.

Particle Size: Minus 10 mesh to plus 200 mesh.

Tonnage: 150 TPH initial feed.

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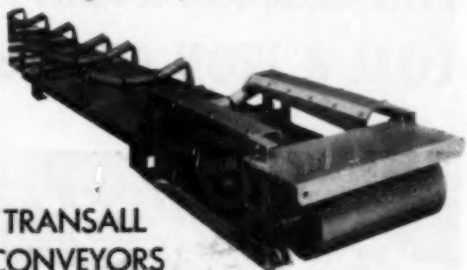


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Conveyor was designed for use throughout the mine: Headings, (and with Transall special mountings) Main Haulage, and Slopes.

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The simplified conveyor is easily set up, knocked down, and moved.

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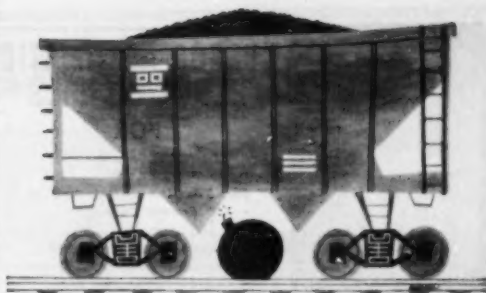


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Order From Your Supply House. Ask for Bulletin HF 508.

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EVEN in sub-zero weather your coal will flow freely when it's treated with Wyandotte Calcium Chloride. Just add Wyandotte Calcium Chloride to your coal as it's loaded in the car. From 100 to 400 pounds (depending upon the size of the coal) will freeze-proof a 50-ton carload.

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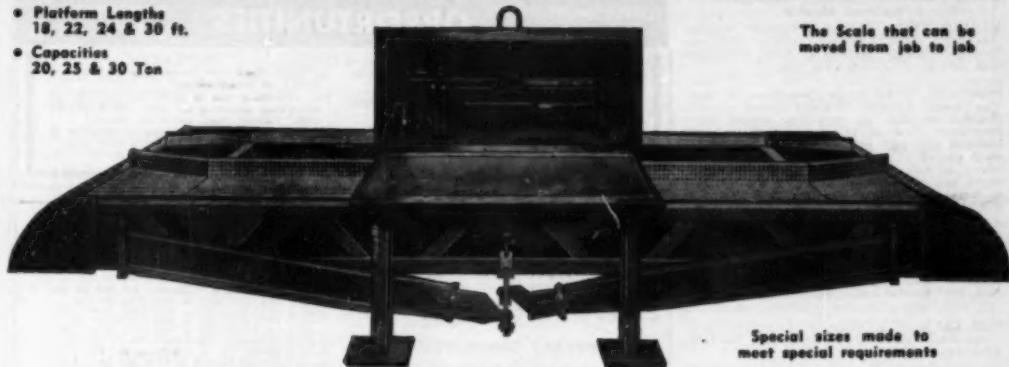
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THURMAN PORTABLE TRUCK SCALE

- Platform Lengths
18, 22, 24 & 30 ft.
- Capacities
20, 25 & 30 Ton

The Scale that can be moved from job to job



Wide Steel Bases—support scale—require no concrete footings. Easy-to-read chrome plated weighbeam with vital parts electroplated against corrosion.

Accurate and Portable—This scale can be transported from job to job by removing 6 nuts which hold side arms in place. The rest of the scale can be lifted as a unit. Once located, it can be readied for use in minutes.

Special sizes made to meet special requirements

THE COMPLETE THURMAN LINE INCLUDES:

- Pit Scales up to 50-ton capacity
- Batching Scales
- Wheelbarrow Scales
- Pitless Scales
- Liquid Weighing Scales
- Warehouse Scales

This and other weighing equipment in sizes to fit your requirements.

THE THURMAN MACHINE CO.—Scale Division
156 North Fifth Street Established 1918 Columbus 15, Ohio



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E. K. Campbell Heavy Duty FURNACE FAN SYSTEMS

- No full-time fireman—FULLY AUTOMATIC OPERATION!
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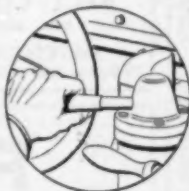
The heating system of proven results and economy for preparation plants, garages, shops and all types of mine buildings.

If you have a heating problem, an E. K. Campbell Company engineer will gladly call without obligation. Write today.

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WESTINGHOUSE HYDRAULIC BRAKES

1. Brake shoe life increased from 1 week to 3 months
2. Wheel turning decreased 50%
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The results listed show why users say these brakes pay for themselves in a short time through reduced maintenance. Simple, rugged, compact equipment can be fitted into available space. Installation can be made any time locomotive is shopped for maintenance. Ask for Bulletin SP 9092 for details.

Westinghouse Air Brake Co. ✕

Industrial Products Division: Wilmerding, Pa.

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MINING AND Industrial Warehouse manager available. Over 25 years experience. All phases handled including purchasing. Good references. Will relocate. PW-2294, Coal Age.

POSITION With Large Coal Corp. as Supr. or General Manager, Stripping Method. Age 45. Healthy, married, go anywhere, several years experience. Best of references. Had my own business and sold out, familiar with large or small equipment, can work Union or Non-union labor. Can talk to the lowest labor or your best buyer, can furnish good labor such as Operators & Mechanics. Would like long line operation. PW-2121, Coal Age.

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NEW VIRGIN FIELD OF COOKING COAL—Federal Land, South Western, Wyo. on Grey River, 75 miles from Alpine, Wyo. Contact J. W. Neil, 3909 Fowler Ave., Ogden, Utah.

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Salary Positions, \$4,000 to \$20,000. This Confidential service for men who desire a new connection, will develop and conduct preliminary negotiations without risk to present position. Good name and address for details.

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Fully equipped including river loading docks, now producing four hundred tons per shift, fourteen miles from large power plant located in Mason County, West Virginia.

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1474 acre mining property located in one of the best soft bituminous coal regions of Ohio, lying between Cleveland and Pittsburgh, is being offered for sale. State Geological Survey estimates gross coal deposits of over 8 million tons; 95% underlain by the Upper Freeport vein of an exceptional thick seam. There is also a vein of Mahoning type coal of good mineable thickness. Mine has not been worked for many years due to difficulties in obtaining machinery. In addition, there are white clay deposits having great potential value, as the property is situated in the midst of some of the largest fire brick, tile and pottery manufacturers in the country.

304 acres of the tract are owned with a large quantity of merchantable oak and other second-growth timber.

For further information, please call or write us.
SCOTT AND McCUNE COMPANY
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- 2—30 T JEFFREY 250 V. 3-MN-77 48-38" Ga.
- 1—25 T G. E. 300/250 V. 3-MN-824-A 44-38" Ga.
- 1—30 T WEST. 250 V. 3-MN-824-C 38" Ga.
- 1—20 T JEFFREY 250 V. MN-77 48-38" Ga.
- 1—20 T G. E. 250 V. (Tandem) MN 800 38" Ga.
- 1—13 T JEFFREY 250 V. MN-2150 38" Ga.
- 1—13 T JEFFREY 250 V. MN-2110 42-38" Ga.
- 1—13 T JEFFREY 250 V. MN-110 44-38" Ga.
- 1—10 T JEFFREY 250 V. MN-2110 48-38" Ga.
- 2—10 T JEFFREY 250 V. MN-110 42-38" Ga.
- 1—10 T WEST. 250 V. ML-100-C 38" Ga.
- 2—10 T GOODMAN 250 V. 30-8 38" Ga.
- 6—8 T JEFFREY 250 V. MN-110 42-38" Ga.
- 2—4 T WEST. 250 V. ML-100-C 44-38" Ga.
- 10—4 T JEFFREY 250 V. MN-80 44-38" Ga.
- 1—0 T G. E. 250 V. MN-823 42-38" Ga.
- 2—4 T WEST. 250 V. ML-101-C 24" Ga.
- 2—4 T GOODMAN 250 V. MS-4-E 38-24" Ga.

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- 2—JEFFREY 250 V. MN-77. Ball Bearing
- 3—WEST. 250 V. ML-100-C. Ball Bearing
- 3—WEST. 250 V. ML-100-R. Ball Bearing
- 2—WEST. 250 V. ML-101-C. Ball Bearing
- 2—G. E. 100/250 V. MN-824-A. Ball Bearing
- 2—G. E. 85/125 V. HW-528-A. Ball Bearing
- 4—WEST. 60 V. V-49-X. Ball Bearing

Extra Armatures Available for above motors.

One (1) 1204' x 30" type 52-B

BELT CONVEYOR

new, without belt.

SMOKELESS COAL CO.

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FOR SALE WIRE ROPE

2—1,250 Ft. Pcs. 1-1/2" Neobling Lacked Smooth Coil Track Strand Wire Rope for Aerial Tramway. NEW—NEVER USED. Apply to THE SHAP CREEK COAL COMPANY, P.O. Box No. 1029, or Tel. 1533, Logan, West Virginia.

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Fully equipped modern operating Coal Mine with Washer

Formerly Consolidated Coal Co. Mine #7

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7 Ft. seam — Capacity 1800-2000

ton daily single shift

Very good top conditions

Excellent truck trade

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- 1-100KW General Electric synchronous Motor Generator Set, AC and 135 HP, 2300 volts, type T8, 1200 RPM. Direct connected to type CD, 100KW, 1200 RPM, 250 volts DC generator, complete with switchboard.
- 1-12KW Westinghouse Motor Generator Set, 250 volts DC, 220 volts AC, complete with switchboard.

MINING MACHINES

- 2-512 EKH Goodman DC shortwall mining machines, complete with bog dusters, hydraulic control, 5 1/2" cutter bars, cables, and Joy TI cat trucks. Serial Nos. 8900, 8910, 8911, 8964, 8965, 8934, 8935 (Like new)
- 2-512-DGSA Goodman shortwall mining machines, AC, 5 1/2" cutter bars, complete with cable. Without trucks.
- 2-512-ELS Goodman shortwall mining machines, AC, 7" cutter bars, complete with Joy TI-4G cat trucks and cables.
- 1-12AAA Goodman Universal shortwall mining machines, AC, without trucks.
- 1-12AAA Goodman standard shortwall mining machines, DC, with trucks.
- 3-Sullivan CLRS longwall mining machines, 2/60/220 volts, with 4 1/2" cutter bars.
- 1-12AAA Goodman Universal DC shortwall mining machine. (With trucks.)
- 2-12AAA Goodman AC, 60 HP, standard shortwall mining machines. (With or Without trucks)

CRUSHERS

- 1-36 x 36 Jeffrey single roll crusher.
- 1-36 x 48 Link Belt double roll crusher.
- 1-24 x 48 McNally Pittsburgh double roll crusher.
- 1-30 x 36 United Iron Works single roll crusher.
- 1-24 x 24 Hercules single roll crusher.
- 1-24 x 34 Webster single roll crusher.
- 1-24 x 24 Stephens Adamson single roll crusher.
- 1-18 x 18 Jeffrey single roll crusher.

- 1-12 x 16 Eagle Iron Works double roll chipper, complete with hopper and 1 1/2 HP AC motor. (Mounted on one base. Like new.)
- 1-48" McNally Pittsburgh Vertical Plank Breaker.
- 2-American Pulverizer Company Ring Roll crushers.

COPPER

Several thousand feet of #2, 2/C, 5,000 volts, lead covered armored cable.
Several thousand feet of 750,000 and 1,000,000 CM, bare and weatherproof, stranded copper wire, in long lengths.
Several thousand feet 4/0 figure 8 trolley wire.
Several thousand feet 1/0 hard drawn bare copper.
Several thousand feet #4 hard drawn bare copper.

LOCOMOTIVES (Bell Bearing)

Make	Type	Gauge
1-20 ton Goodman	36-AO4T	42"
1-10 ton Jeffrey	MH110	42"
1-18 ton Goodman	39A-O-4-C	42"
1-16 ton Jeffrey	MH110	42"
3-8 ton Goodman	32AO4T	36"
1-8 ton Goodman	32AO4T	42"
1-6 ton Goodman	42-1-4-T	36"
5-6 ton G. E.	HMH21A	42"
1-6 ton G. E.	HM708B	42"
1-6 ton Jeffrey	MH64	42"

DRILLS

Several Chicago Pneumatic, 472 and 473 AC and DC drills.

PIT CAR TRUCKS

150 sets—42" gauge, 14" diameter, Sanford Day Timken bearing pit car trucks.

HOPPER CARS

22-15 ton Sanford Day automatic drop bottom cars with multiple latch arch bar truck, 4 wheels under each end, 18" wheels, 36" gauge, Sanford Day roller bearing trucks. Overall dimensions: Overall length over bumpers 28'2"; Overall length inside 29'11 1/2"; Overall width 8'10 1/2"; Overall height 8'6". Size of door: Width 8'9". Length both doors 11'9 1/2".

CONVEYORS

- 1-Jeffrey Apron Conveyor, 48" wide and approximately 51' long.
- 1-Webster Apron type Feeder, 54" wide and 11' long.
- 2-Goodman 97-C-30 Head and tail pulleys complete with Link Belt speed reducers and AC motors.
- 1-22" wide Godfrey Right conveyor 84' long.

RAILS

Approximately 100 tons used 16 1/2" rails, random lengths.
Several hundred tons of rails, 8 1/2" and up, suitable for roof bars, random lengths from 5 1/2' and up.
We carry splices, angle bars, track bolts, and track spikes in stock.

VIBRATORS

- 1-48" x 100", style C-700, Robbins Gyrex double deck.
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26"	4	1/8"	1/32"	28 Oz.
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32"	4	1/8"	1/16"	32 Oz.
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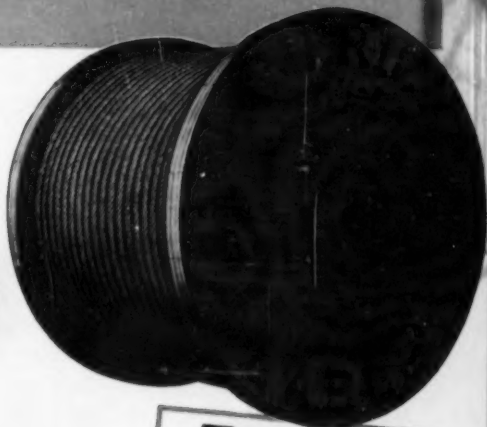
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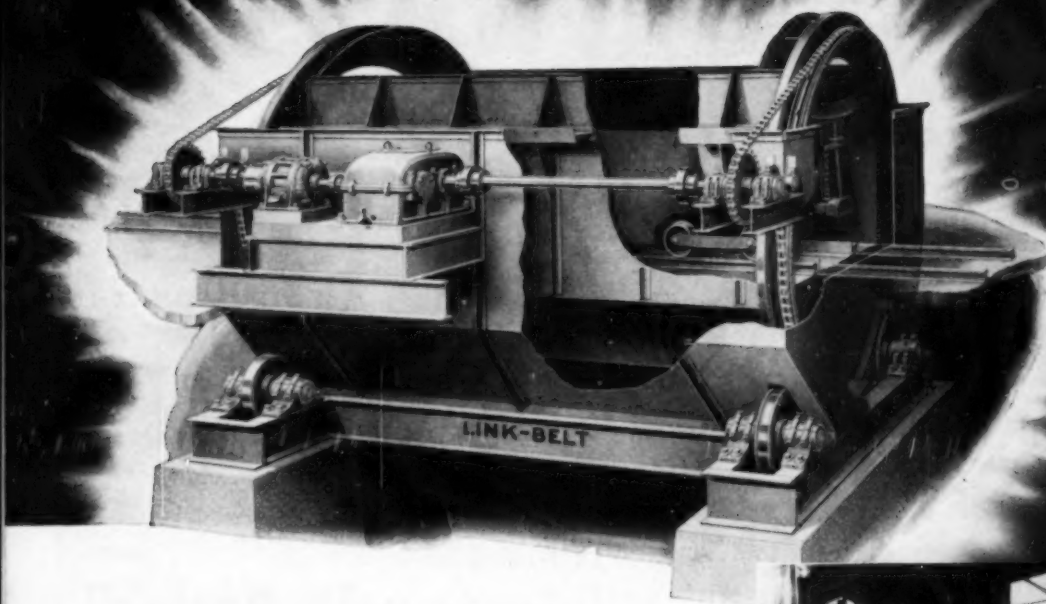
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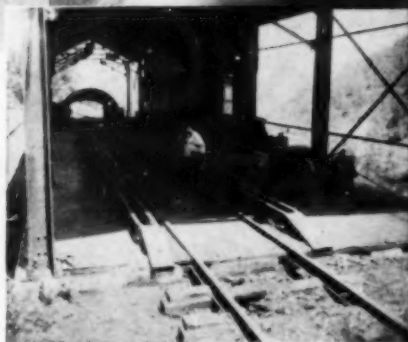
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